INDEX NUMBER

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AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY

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1. Causey, P. S., Reed, W. A., and Ford, J. L.: Arizona Med. *8*:27 (Dec.) 1951.

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1. Doyle, J. C.: California Med. *71*:15 (July) 1949. • 2. Doyle, J. C.: Urol. & Cutan. Rev. *55*:618 (Oct.) 1951. • 3. Hamblen, E. C., in Stieglitz, E. J.: Geriatric Medicine, ed. 2, Philadelphia, W. B. Saunders Company, 1949, p. 657.

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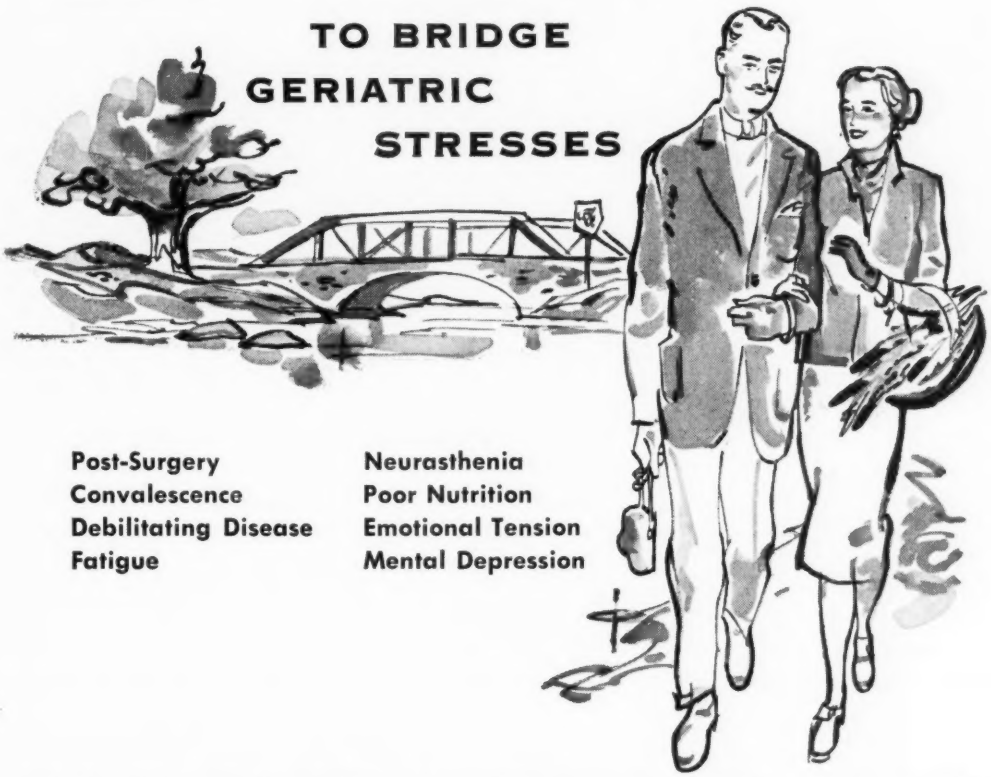

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*Page, E. W., and Page, E. P.: Obstet. & Gynec. *1*:94 (Jan.) 1953.

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*Fiskio, P. W.: GP *11*:70 (May) 1955.

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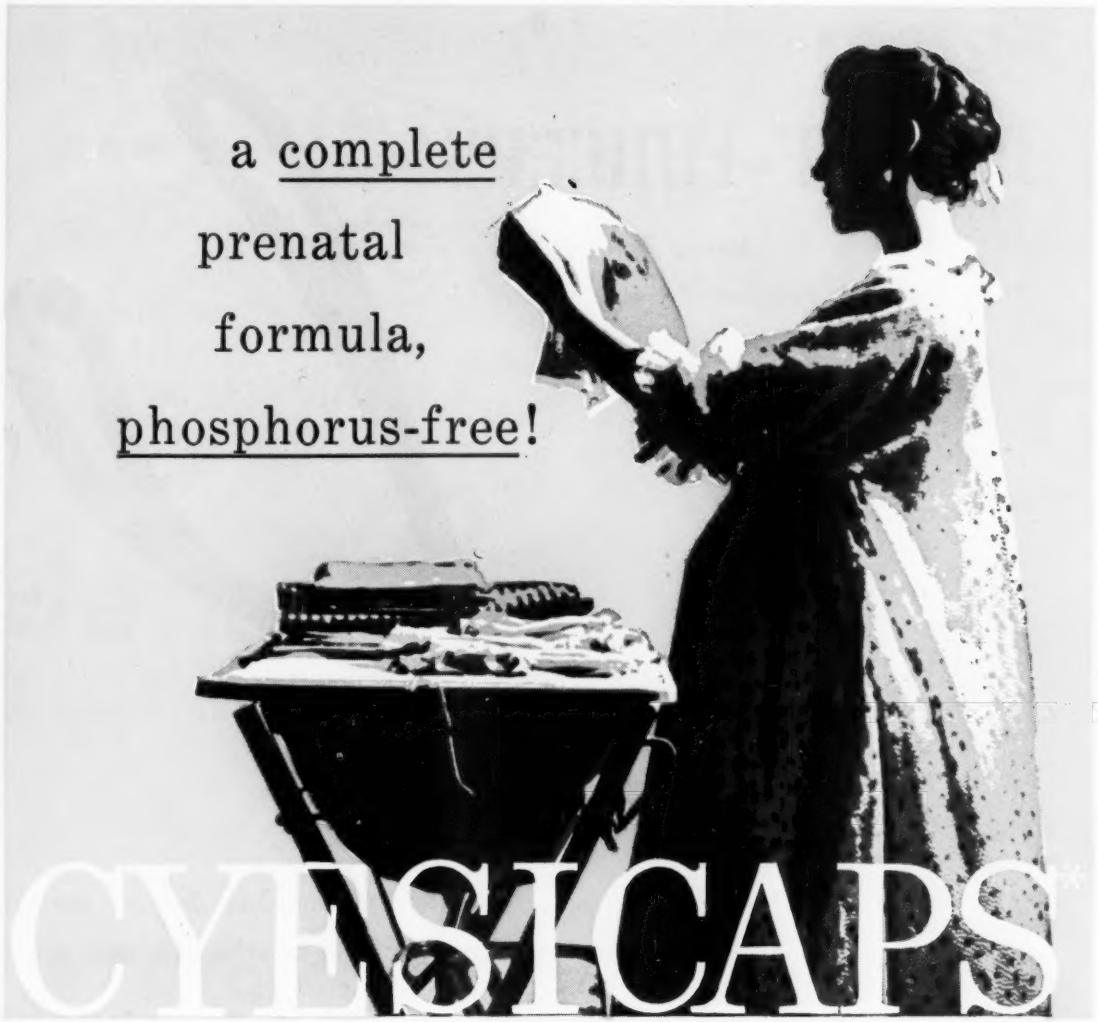

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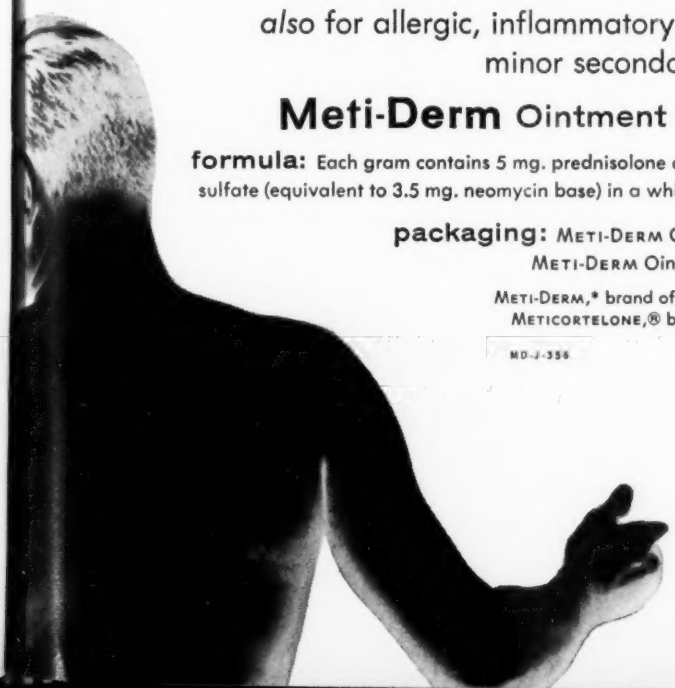

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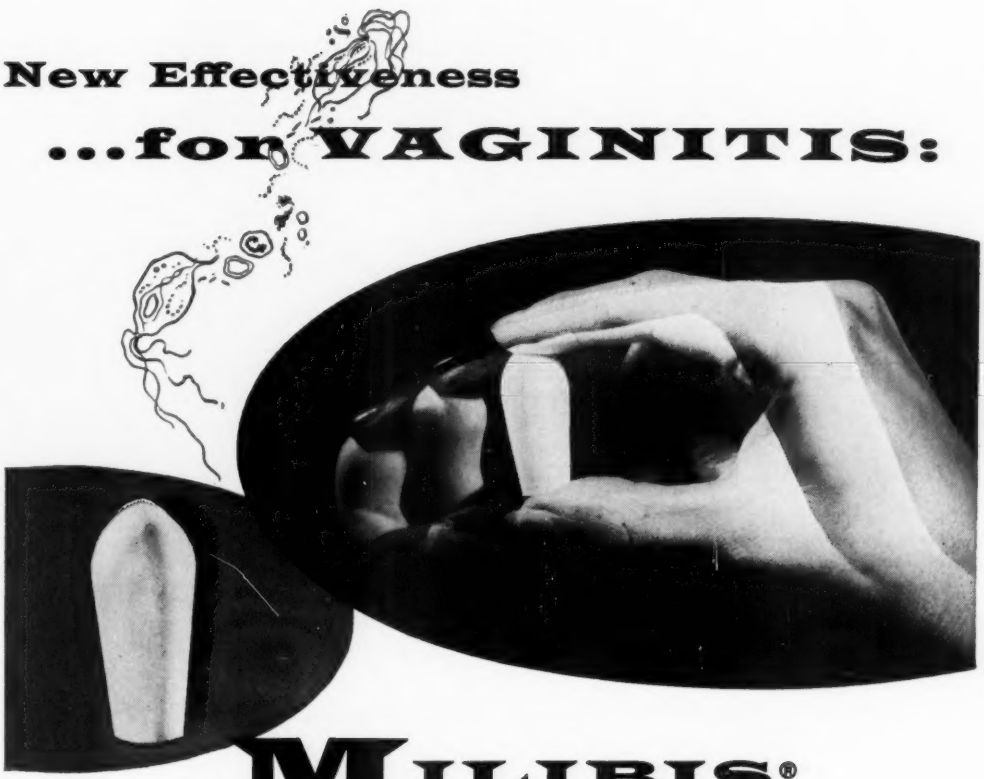

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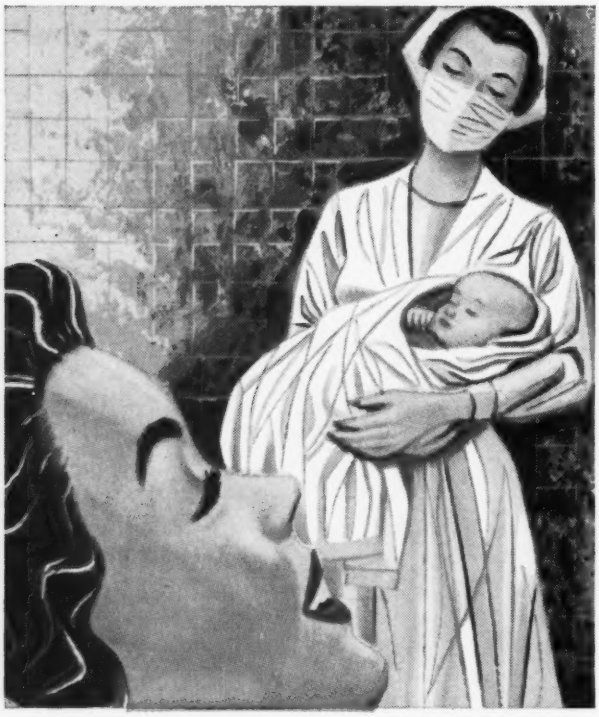

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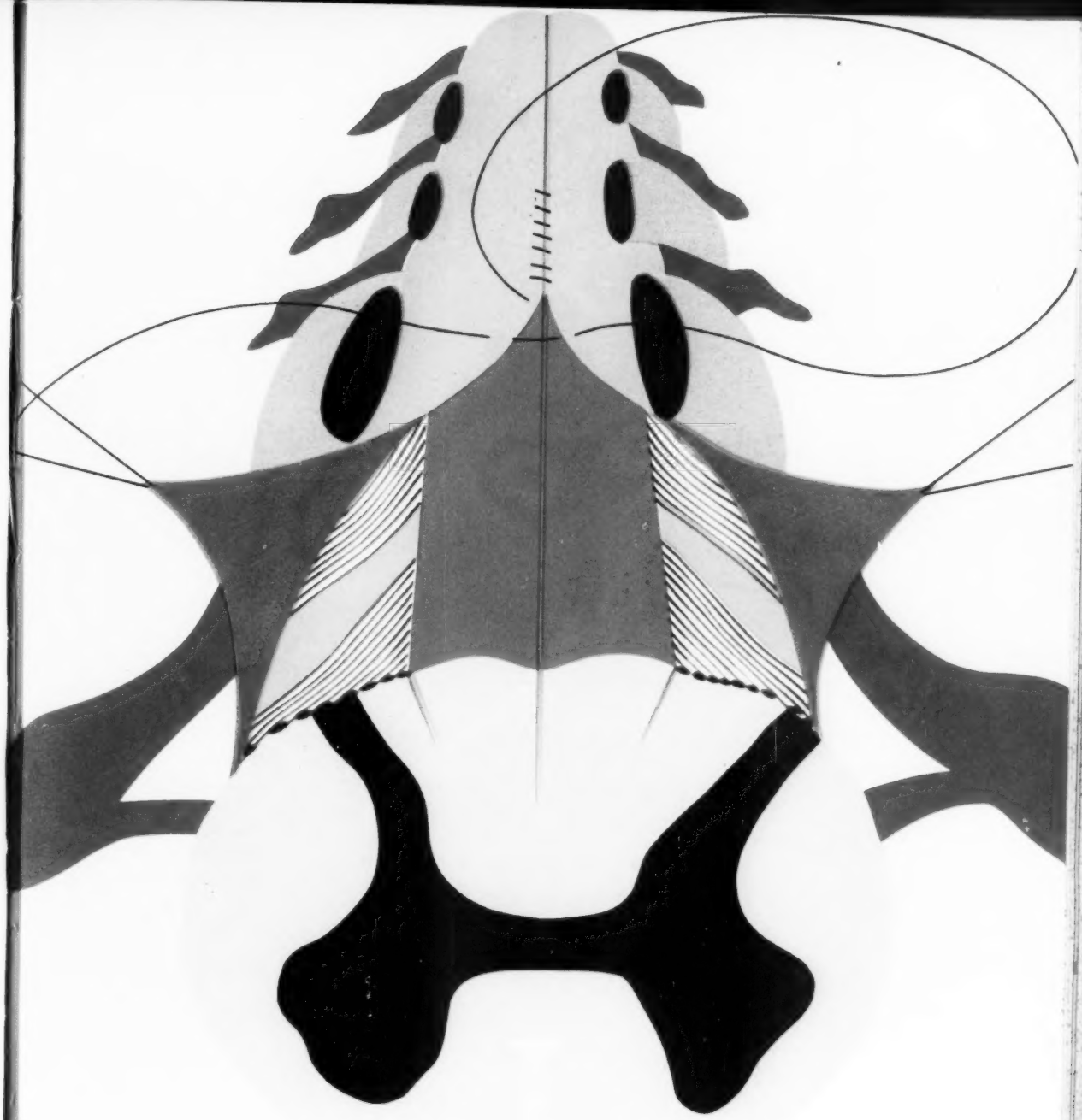

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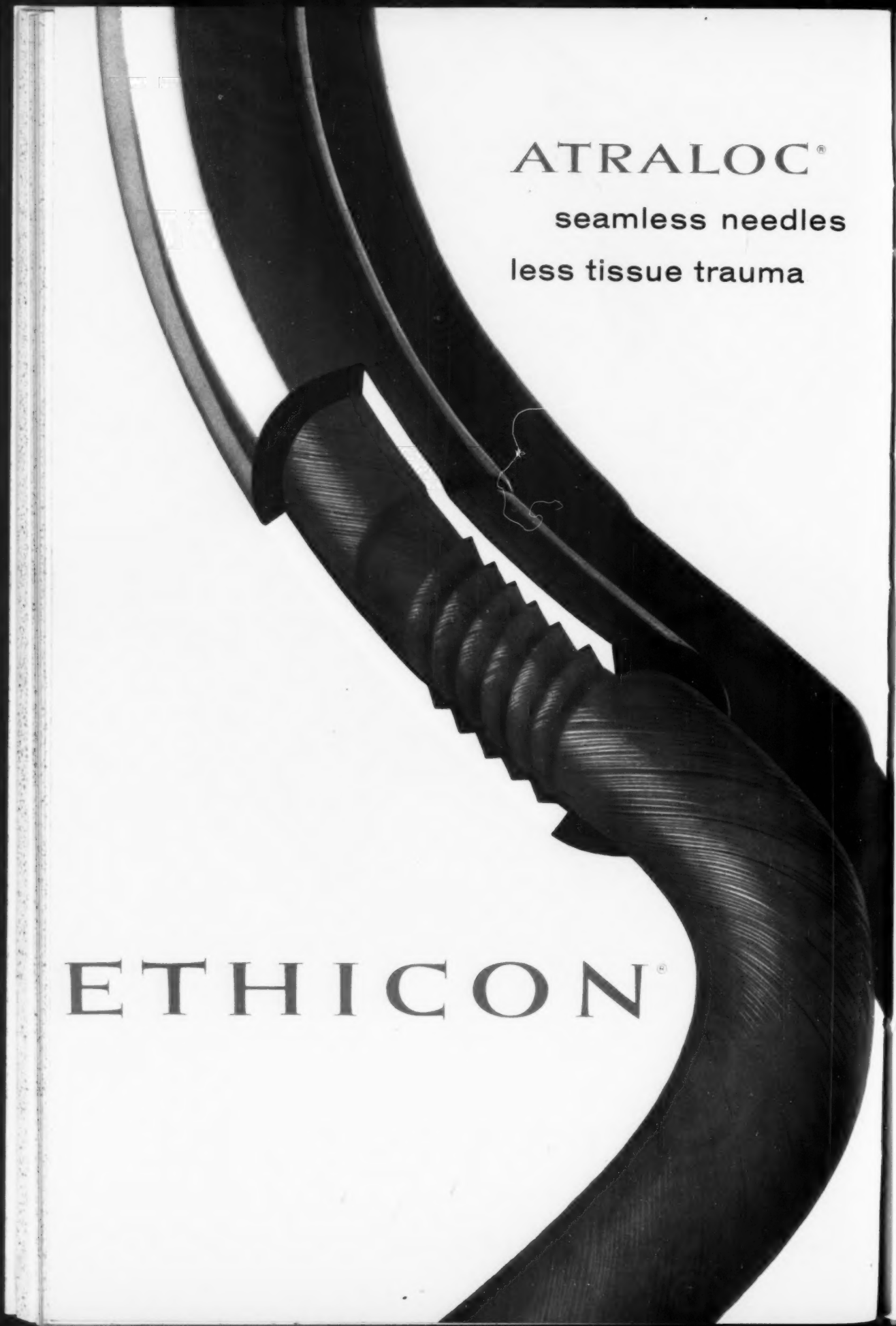
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1. Anz, U. E., and Smith, L. J.: Clinical Evaluation of Chlorpromazine in the Management of Labor, Am. J. Obst. & Gynec. *71:* 1242 (June) 1956.

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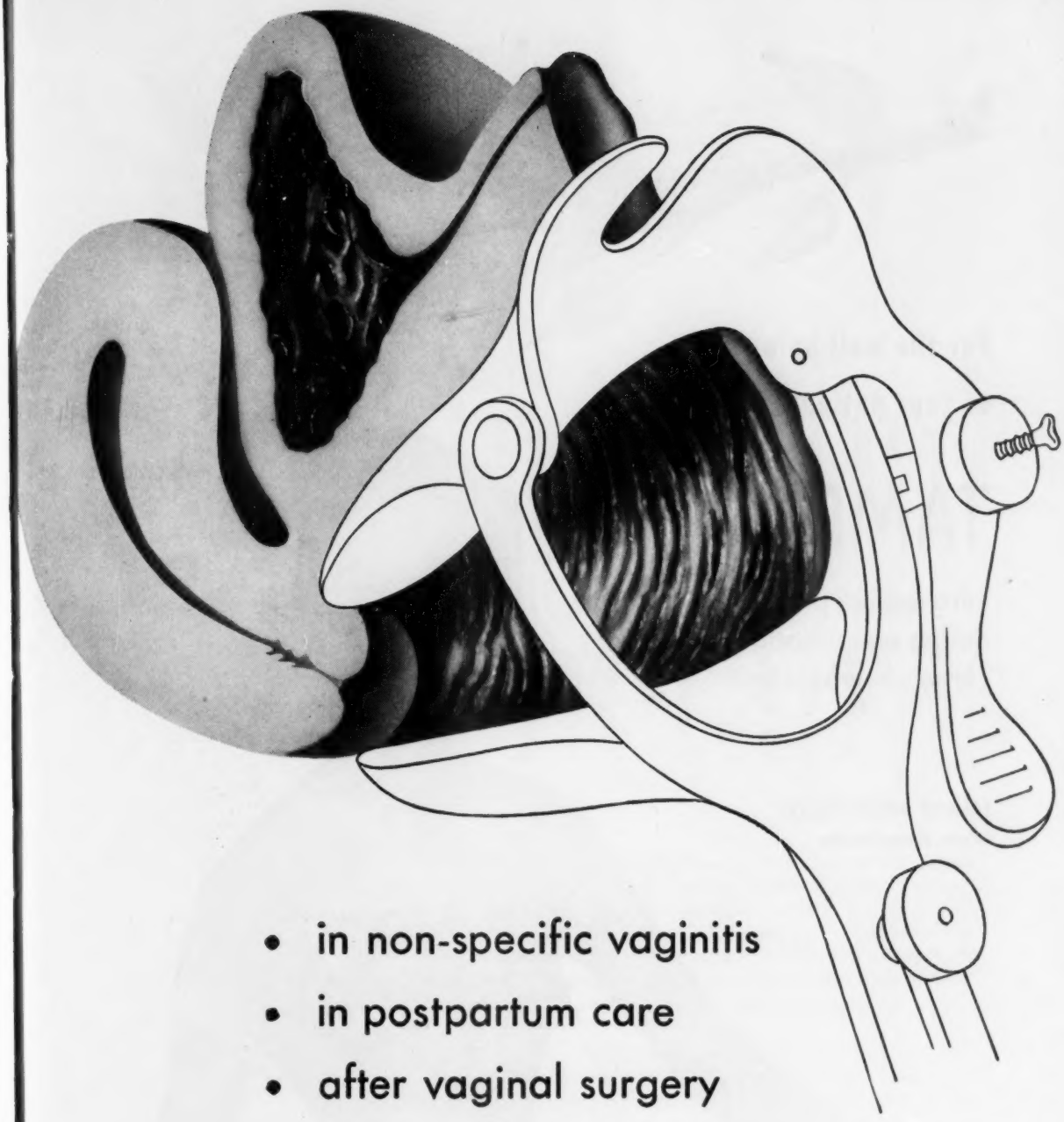

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RAUWILOID® (alseroxylon) is recognized as basal medication in all grades and types of hypertension. Alone, it controls most mild, labile cases. When more potent agents are required, their combination with Rauwiloid permits smaller doses with resultant reduction or elimination of side effects, and a more stable, dependable therapeutic response.

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Vitamin A Acetate	1000 USP units
Vitamin D_2	200 USP units
Thiamine Mononitrate	1.25 mg.
Riboflavin	0.75 mg.
Nicotinamide	5.0 mg.
Vitamin B_{12}	0.75 micrograms
Folic Acid	0.05 mg.
Pyridoxine Hydrochloride (B_6)	1.67 mg.
Calcium Pantothenate	1.0 mg.
Ferrous Gluconate (2.5 mg. iron)	21.6 mg.
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In bottles of 100 and 500 capsules.

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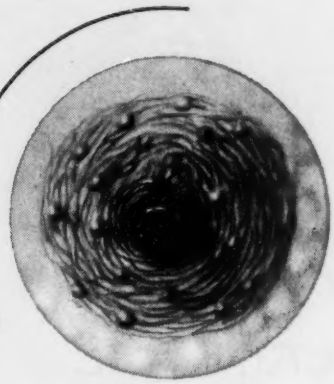

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The use of White's Vitamin A & D Ointment soothes and softens the fissured nipple, promotes tissue regeneration.

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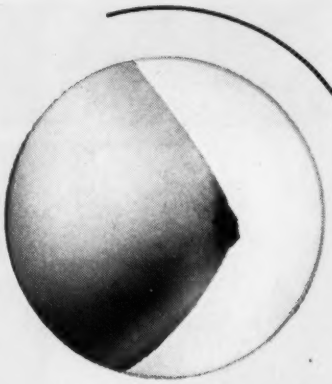

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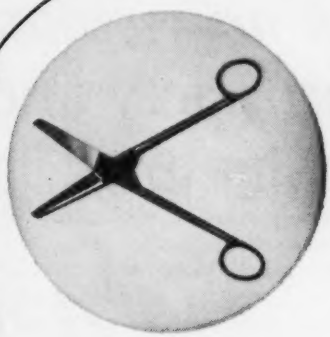

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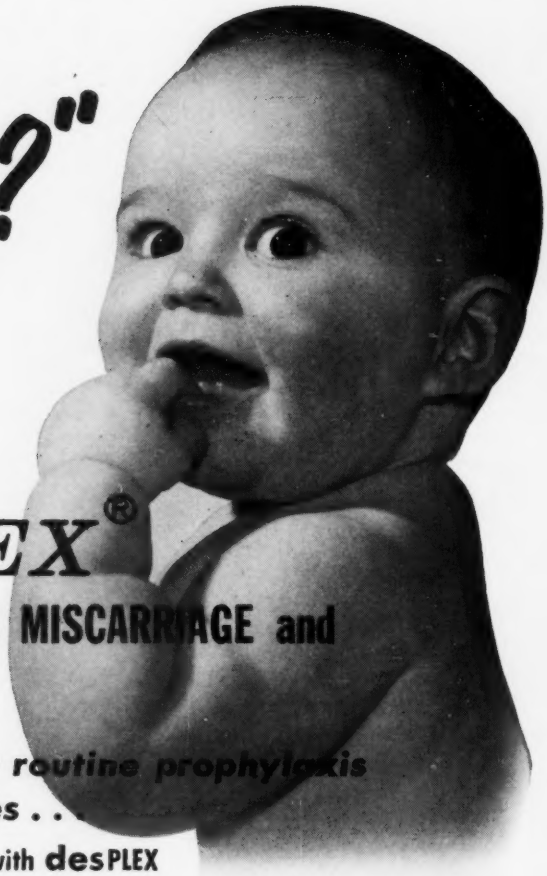

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REFERENCES

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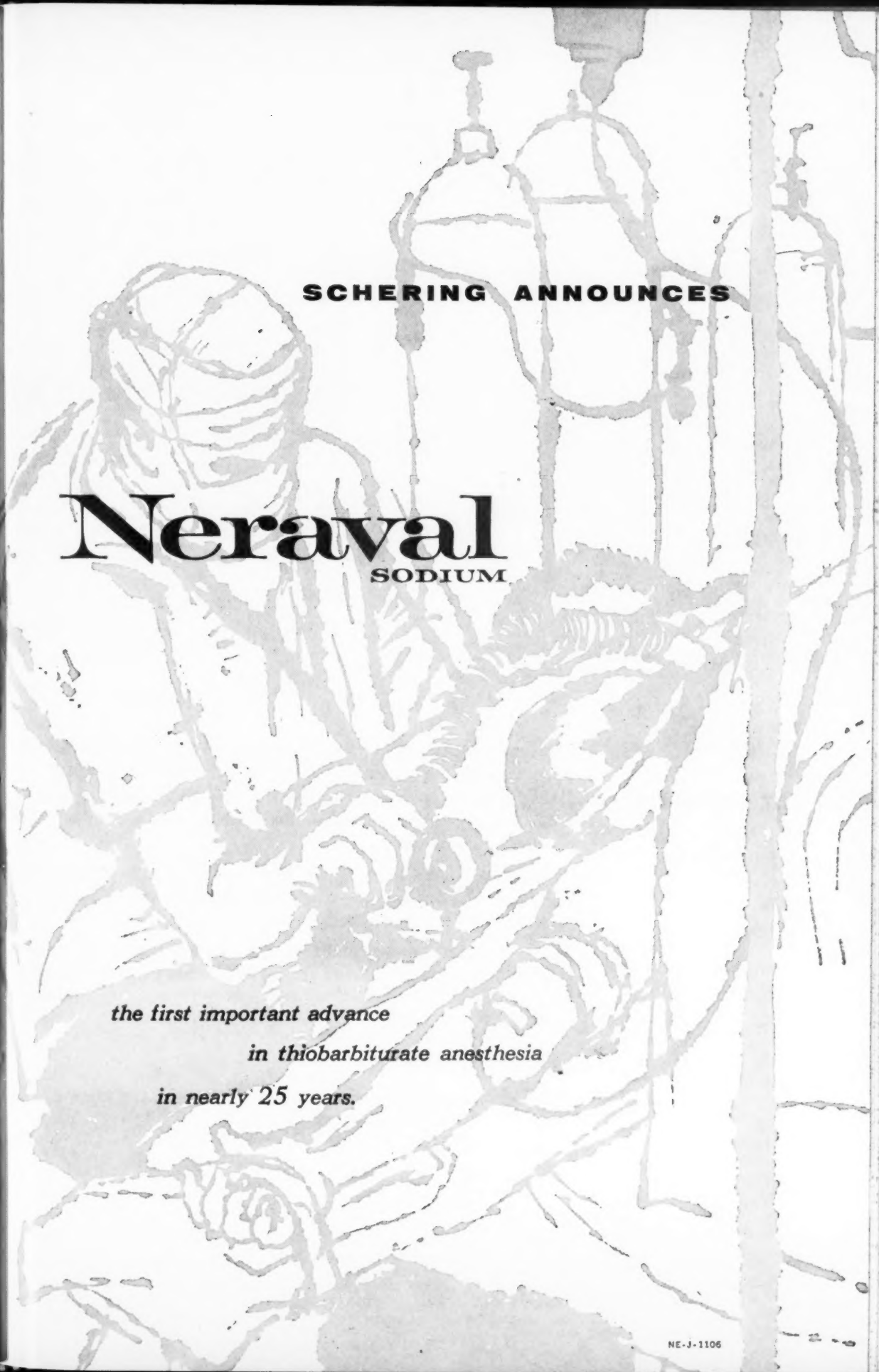

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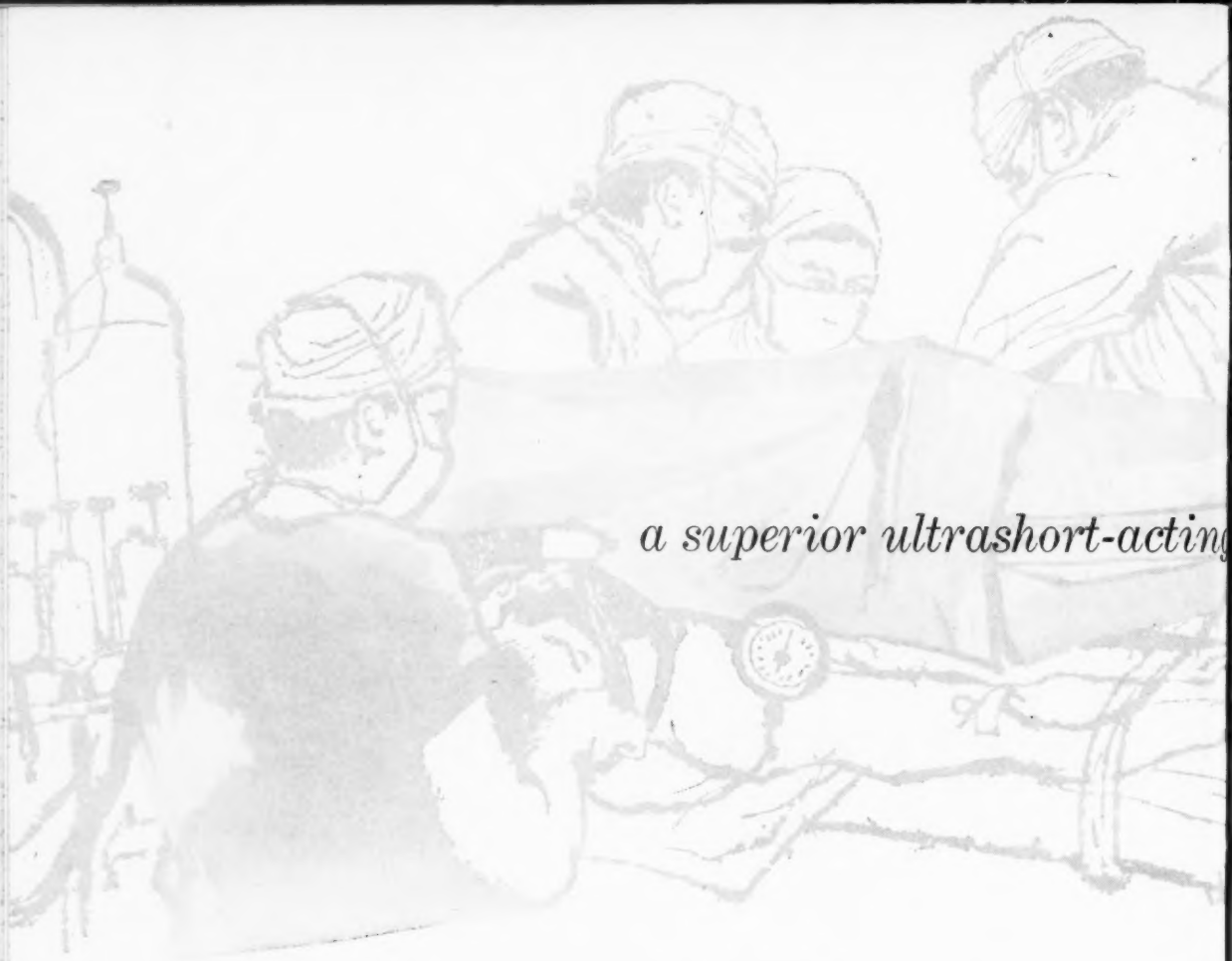

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1. Boone, J.D.; Munoz, R., and Dillon, J.B.: Anesthesiology *17*:284, 1956. 2. Zima, O.; von Werder, F., and Hotovy, R.: Anaesthesist *3*:244, 1954. 3. Fitzpatrick, L.J.; Clarie, D'A., and Mersch, M.A.; To be published. 4. Blake, M.W. and Perlman, P.L.: J. Pharmacol. & Exper. Therap. *117*:287, 1956. 5. Ayd, F.J., Jr.: Neraval: A new anesthetic for electroconvulsive therapy, paper presented at annual meeting, Electroshock Research Association, Chicago, Illinois, April 29th, 1956. 6. Irwin S.; Stagg, R.D.; Dunbar, E., and Govier, W.M.: J. Pharmacol. & Exper. Therap. *116*:317, 1956. 7. Reifferscheid, M., and Dietmann, K.: Deutsche med. Wchnschr. *79*:638, 1954. 8. Dietmann, K.: Deutsche med. Wchnschr. *79*:1748, 1954.

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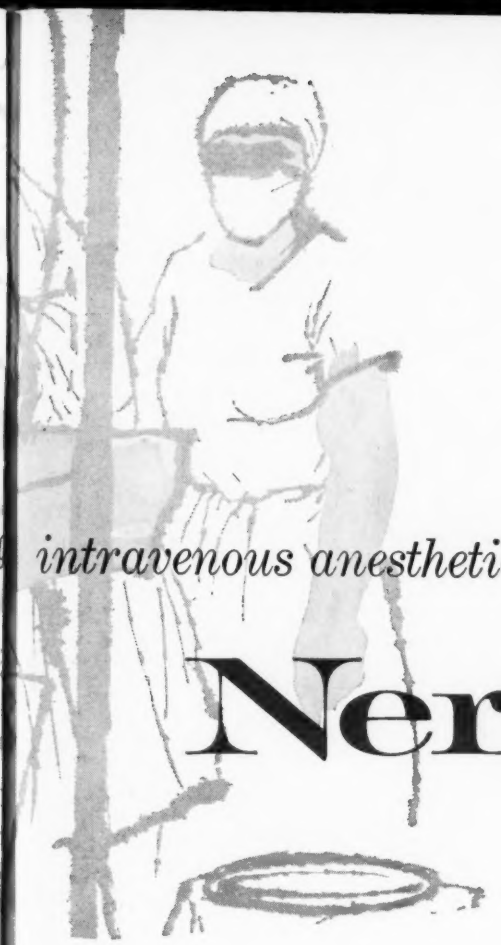

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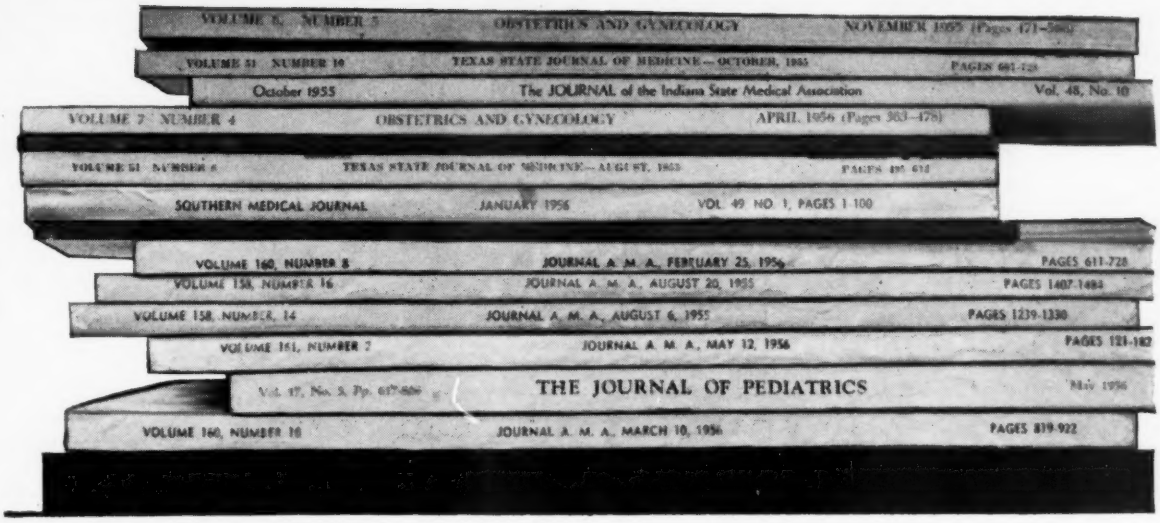
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A

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Radioautographs* prove unique TACE fat storage supporting fat bioassay findings of Greenblatt[1] and Thompson.[2]

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B

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1. Greenblatt, R. B., and Brown, N. H.: Am. J. Obst. & Gynec. 63:1361, 1952. 2. Thompson, C. R., and Werner, H. W.: Proc. Soc. Exper. Biol. & Med. 77:494, 1951. 3. Woodhull, R. B.: Obst. & Gynec. Surv. 3:201, 1953. 4. Editorial: Management of the Menopause, J.A.M.A. 158:566, 1955. 5. Edwards, B. E.: J. Indiana M. A. 47:869, 1954. 6. Gillam, J. S.; Hunter, G. W., and Darne, C. B.: J. Clin. Endocrinol. 14:272, 1954. 7. Nulsen, R. O.; Carmon, W. B., and Hendricks, H. O.: Am. J. Obst. & Gynec. 65:1048, 1953.

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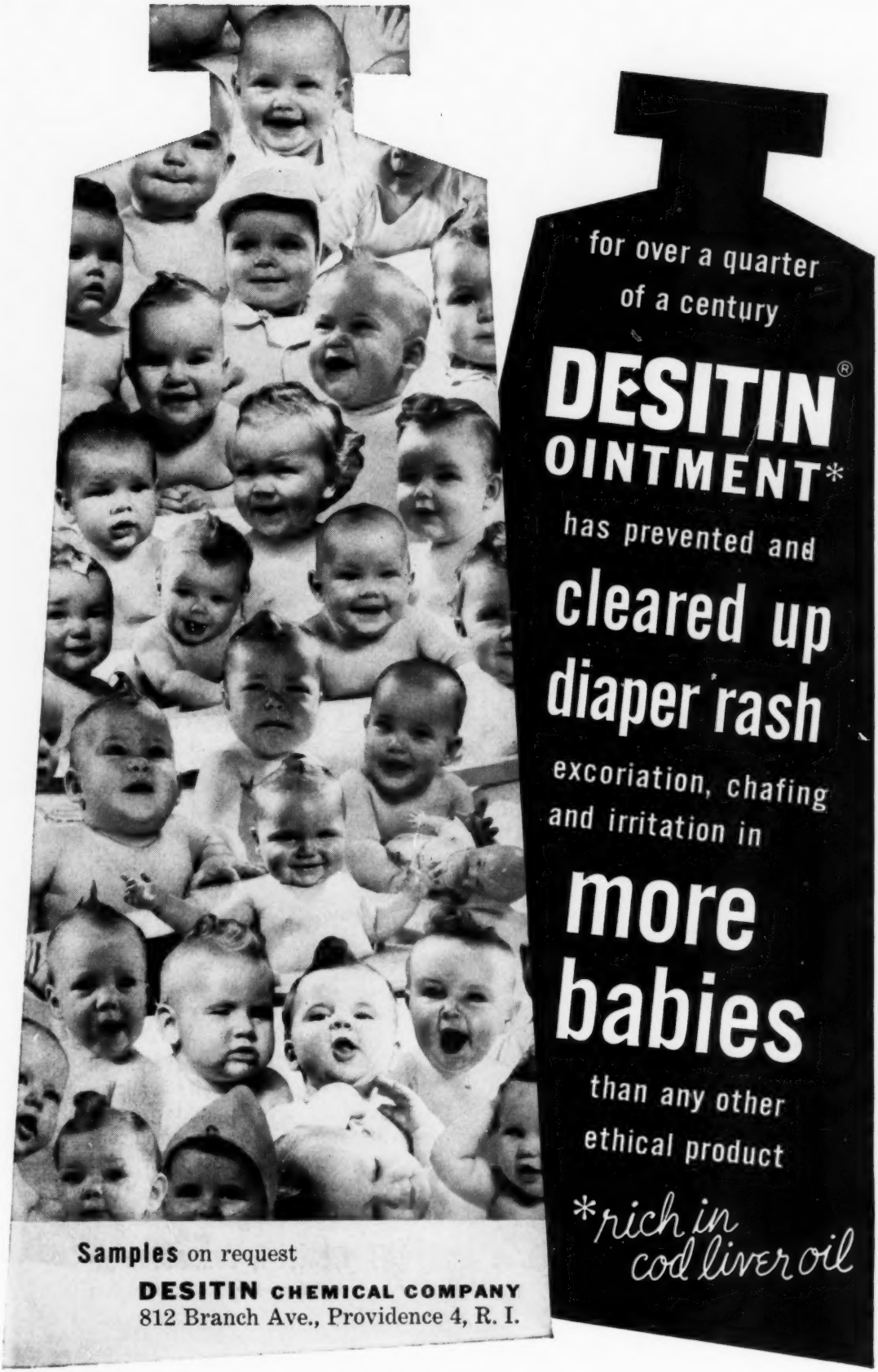
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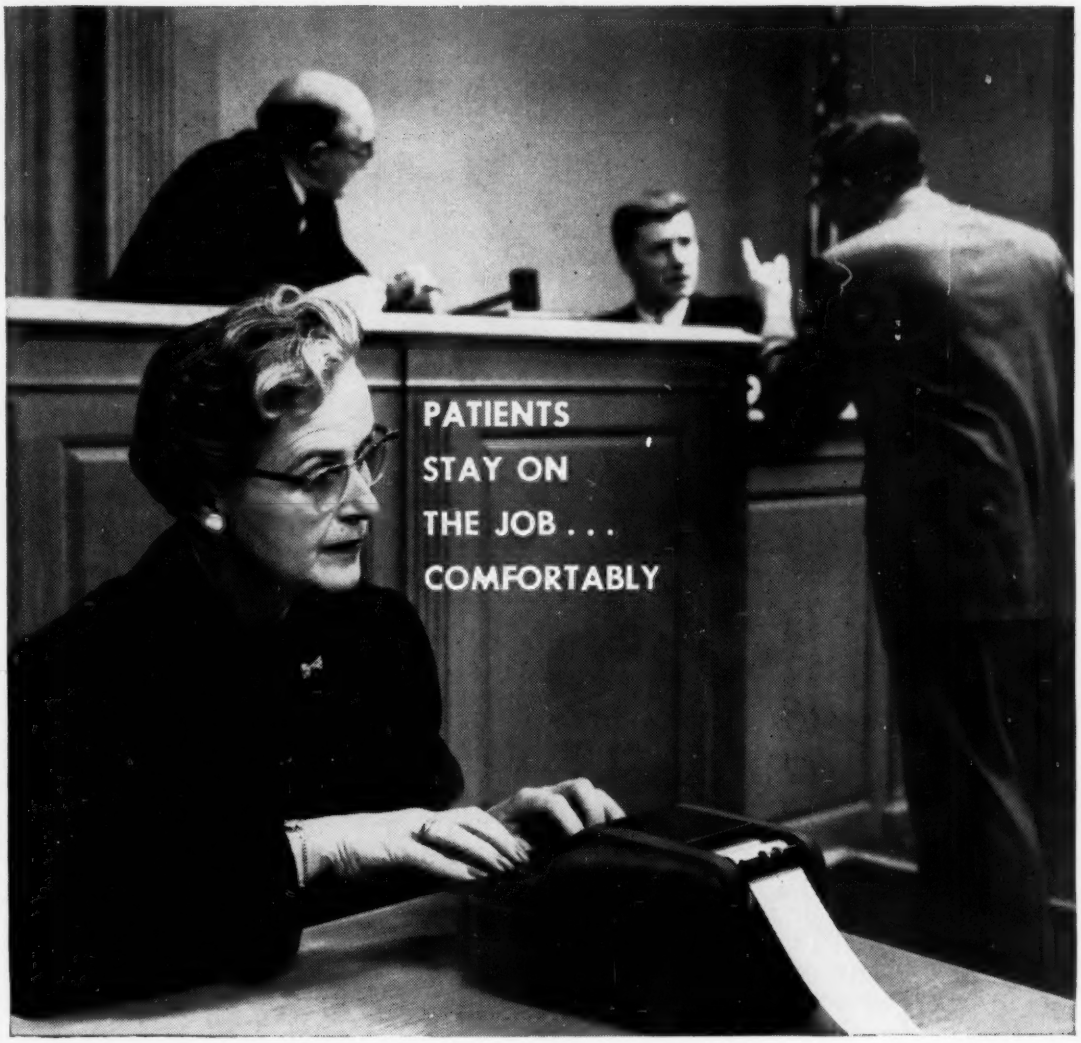

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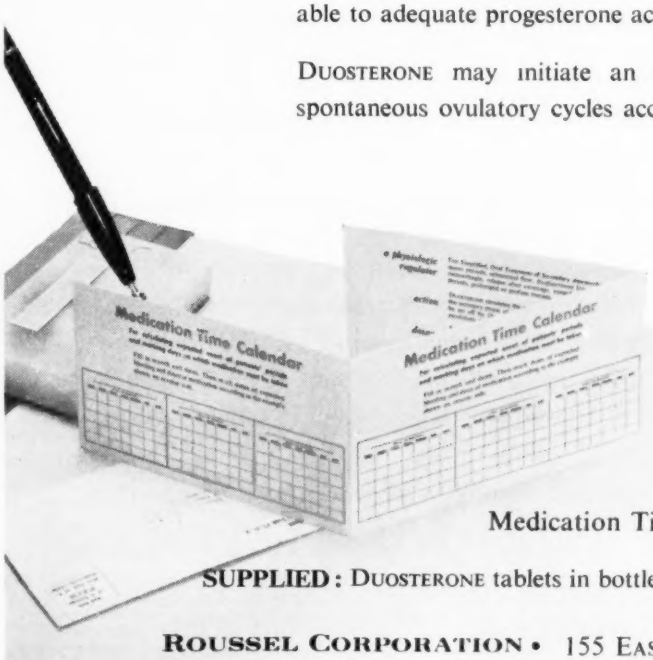

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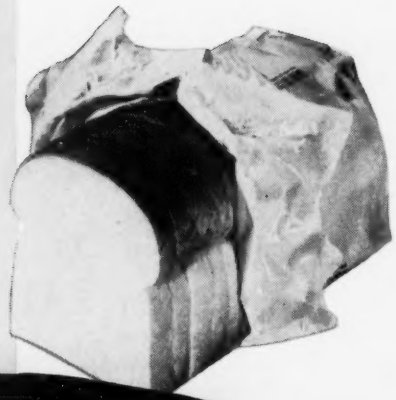

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References: **1.** Eastman, N. J.: Am. J. Obst. & Gynec. *67*:701 (April) 1954. **2.** A New Focus: Perinatal Mortality, New York: Metropolitan Life Insurance Co. **3.** Pasamanick, B., and Kawi, A.: J. Pediat. *48*:596 (May) 1956. **4.** Abramson, D., and Reid, D. E.: J. Clin. Endocrinol. & Metab. *15*:206 (Jan.) 1955. **5.** Eichner, E.; Waltner, C.; Goodman, M., and Post, S.: Am. J. Obst. & Gynec. *71*:1035 (May) 1956.

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American Journal of Obstetrics and Gynecology

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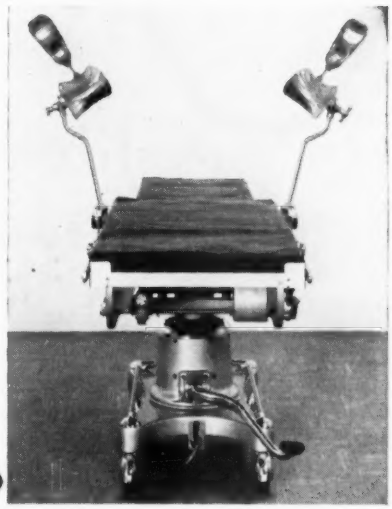

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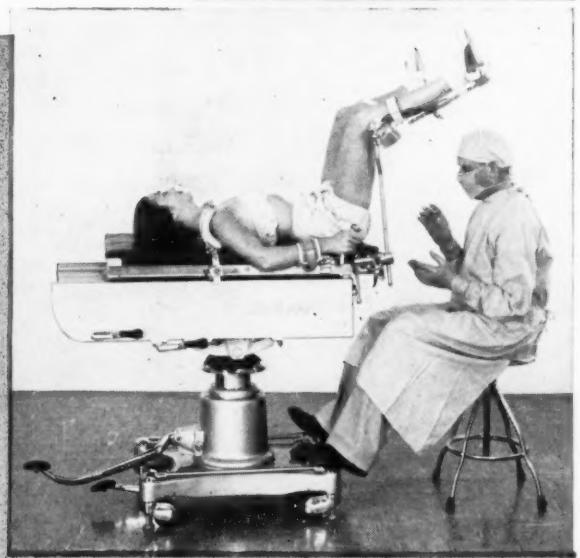

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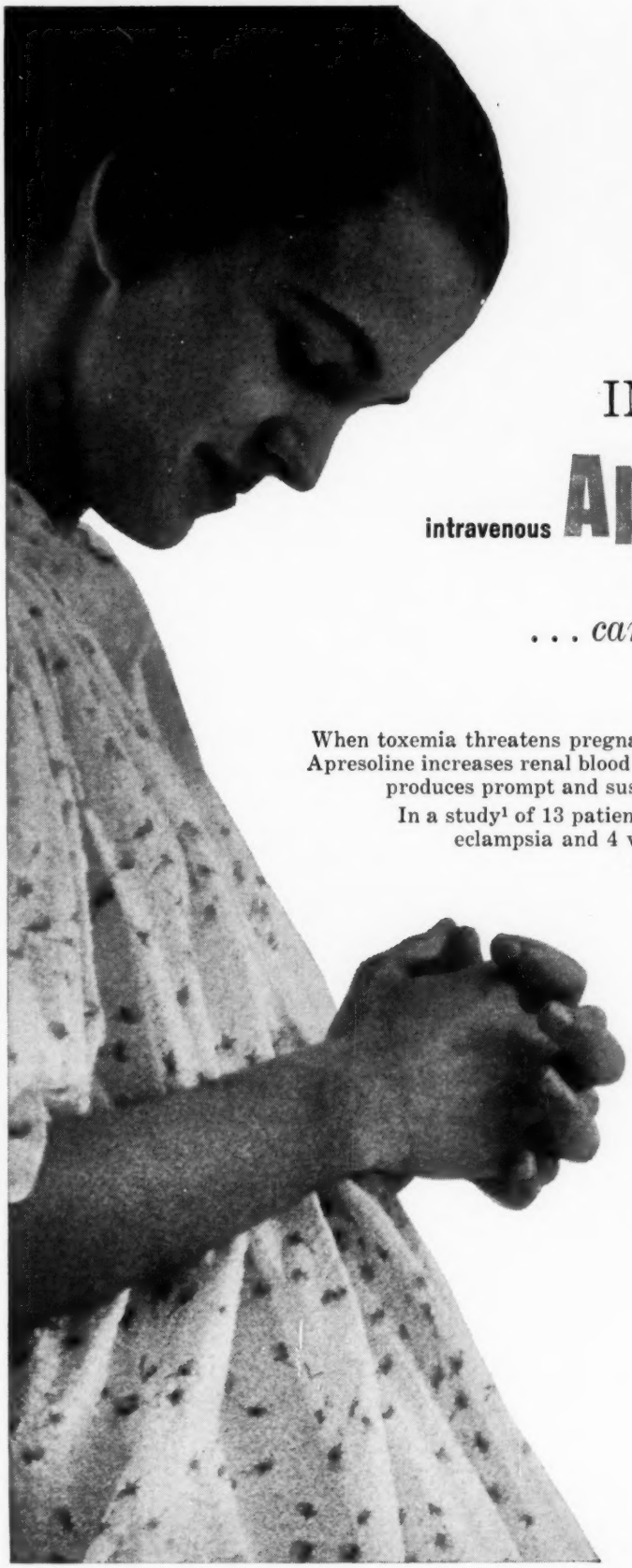

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1. Kistner, R. W.: J. Obst. & Gynaec. Brit. Emp. *61*:463 (Aug.) 1954.

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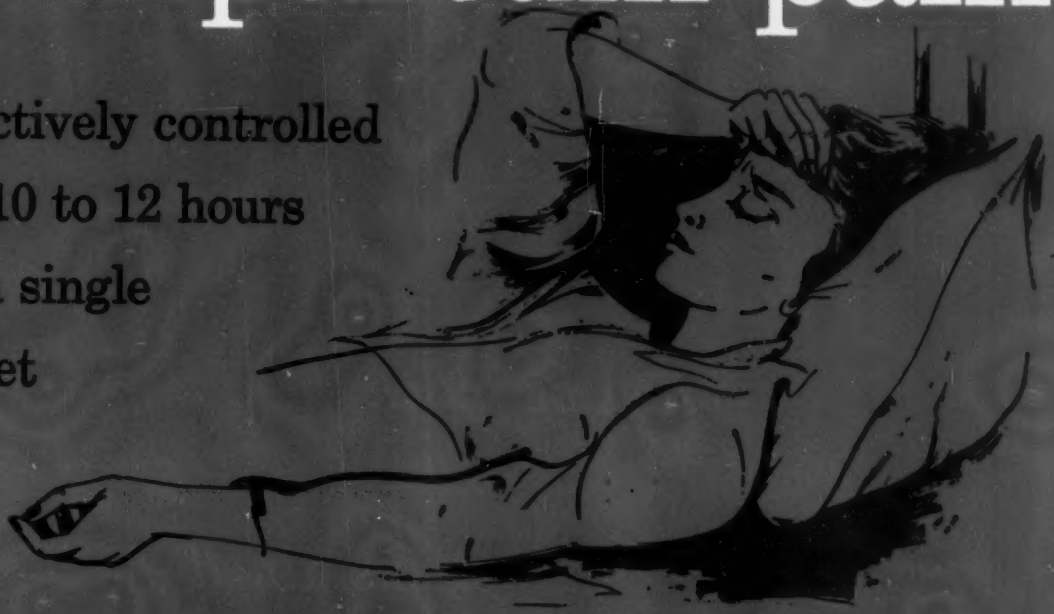

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1. DeLee, J. B., and Greenhill, J. P.: Principles and Practice of Obstetrics, Philadelphia, W. B. Saunders Company, 1948; p. 299.
2. Williams, W. J.: Obstetrics, Eastman, N. J. (ed.), New York, Appleton-Century-Crofts, Inc., 1950; p. 430.
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4. Goodman, L. S., and Gilman, A.: The Pharmacologic Basis of Therapeutics, N. Y., The Macmillan Company, 1955; p. 127.

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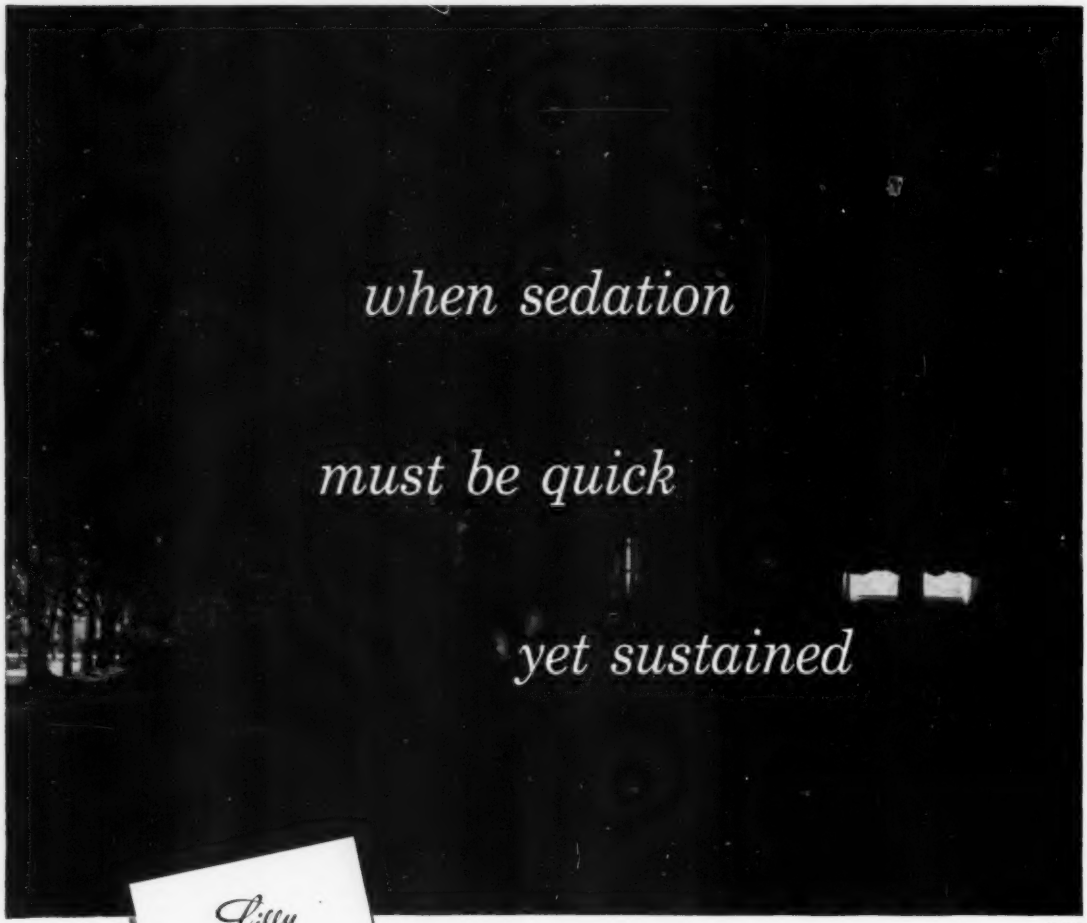

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HYSTERECTOMY—A PROBLEM IN PUBLIC RELATIONS*

President's Address

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TEN years ago, an article appeared in the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY with the startling title, "Hysterectomy: Therapeutic Necessity or Surgical Racket?" In this article, Miller[1] presented the results of a study he had made of the records of 246 hysterectomies performed in ten midwestern hospitals during the first four months of 1945. His conclusions were as arresting as the title under which he published them: Almost one fifth of the women operated upon were recorded as having no disease of the pelvic organs. There was no histopathology of the removed organs in 76 of the 246 cases. In only 49.7 per cent was the clinical diagnosis confirmed.

In commenting on this article, Greenhill[2] wrote: "Miller's report is a serious indictment of what is being done in surgery as far as one organ, the uterus, is concerned." From his own experience, he added that only a small proportion of women who have fibromyomas of the uterus require treatment, and he listed as the "only indications of hysterectomy in the presence of fibroids" the following: "profuse bleeding, rapid growth of tumors, and considerable pain associated with softening of the tumors."

*Presented at the Eighteenth Annual Meeting of the South Atlantic Association of Obstetricians and Gynecologists, Hollywood, Florida, Jan. 29 to Feb. 1, 1956.

NOTE: The Editors accept no responsibility for the views and statements of authors as published in their "Original Communications."

Miller's study was followed by several similar investigations. Lee[3] made a study of 187 hysterectomies performed in one hospital in 1946. Of these, he found that 46, or 24 per cent, were contraindicated on the basis of pathological findings. In publishing his findings in 1948, he noted a need for a closer study of the indications for the hysterectomy and "perhaps a freer use of the curette and other less radical agents for uterine dysfunction." He added, "In the event of a continued poor record in our hospitals, perhaps we may even need a hysterectomy consultation schedule similar to that in effect in Seattle for cesarean sections." In 1948, the year Lee's work was published, Doyle[4] studied the records of 6,248 operations performed in 35 hospitals during that year. In recording his conclusions, he wrote: "Hysterectomies open to criticism totaled 2,458 (39.3 per cent), but the percentage varied greatly with the hospital." In the hospital with the best record, only 5.2 per cent were questionable while the worst record showed that 83.7 per cent of the hysterectomies did not seem justified. These conclusions were set forth in an article in 1953, five years after the studies were made.

These men are eminent physicians, outstanding in their field, and they were writing for gynecologists like themselves who use the same technical terms, understanding not only what the words denote but their connotations as well. They expect the reader to read critically and to evaluate from his experience the results they have set forth.

As he reads these articles, the gynecologist acknowledges with Greenhill that these reports are a serious indictment of what is being done in uterine surgery; but he is not blind to the fact that these localized studies, while indicative of a situation, are not proof of a nationwide racket. He suspects that some of the cases cited may spell carelessness in keeping records rather than unnecessary surgery. He probably notes the dates in which the various investigations were made and assumes, with reason, that the situation they have uncovered has improved in the intervening years.

What is the layman's reaction to these articles? You say, of course, that they were not written for him and that it is most unlikely that he will ever see them. It *was* unlikely: yet these studies and others like them were cited in the *Ladies' Home Journal* and the *Reader's Digest* in an article entitled: "Hysterectomy: Medical Necessity or Surgical Racket?" The author signs herself Lois Mattox Miller.[5] I had assumed, erroneously, that she was Norman Miller's wife and thus had a more or less intimate knowledge of her subject. Since this was not the case, I can only guess that someone talked shop at a cocktail party.

The manner in which the material came into the hands of a writer for women's magazines is not as important as the reaction of the common reader to such statements as "each year an increasing number of women, many of them in the prime of life, submit to this operation" and "hysterectomy now ranks so high on the list of unnecessary surgery that many doctors have called it 'operation question mark.'" This article is buttressed with totals and percentages and the names of some of the best-qualified obstetricians and gynecologists in the country. The author notes that Norman Miller found fibroid

tumor to be the most common diagnosis leading to hysterectomy, and she then goes on to cite two studies to prove that the presence of fibroids does not necessitate the removal of the uterus.

What does this well-documented article say to the common reader? Is he likely to note that the two studies on fibroids were made several years after those on hysterectomies and that they prove that the men quoted, Frank,[6] and Mauzy, Loek, and Donnelly[7] were *not* using fibroids as an excuse for hysterectomies? He is not. He is impressed by the names and the figures, but he is not greatly enlightened by them. To him, this article says: Hysterectomies are unnecessary. It's a racket. Doctors cannot get enough ligitimate surgery; so they scare people into submitting to a major operation which is unnecessary. Lois Mattox Miller has said nothing of the sort, but the impression remains.

This foolish misconception is then added to others with which the gynecologist has long been familiar: hysterectomies cause obesity, excessive growth of hair, and mental breakdowns. They make sexual intercourse impossible and thus lead to divorce. These results have always been proved by the experiences of Elmer's Aunt Sadie or Mrs. Higgenbothom's next-door neighbor's sister from Minneapolis and others. Added to these there has always been that mysterious "They say." Now we hear, "I read a story in a magazine."

We would like to ignore such foolish misconceptions, but, taken together, they complicate the emotional problems which are to be expected incident to hysterectomy. The fear of pain and the fear of the unknown are emotional reactions which are familiar to all surgeons; but the unvoiced fears which grip the woman who is faced with the knowledge that a hysterectomy is unavoidable in her case cause untold and unnecessary suffering and constitute an added problem for the gynecologist.

These fears vary somewhat with the age of the woman who is faced with them. The young woman, especially if she is childless, has good reason for shrinking from an operation which will leave her sterile. This is a pain for which the physician has no balm; it must simply be accepted. However, there are other apprehensions, usually unvoiced, which are based on misconceptions, and these may be relieved. The young woman fears the loss of libido and possibly of her husband's affection, and she thinks she will become an "old lady" before her time because of the surgical menopause.

Middle-aged women are not concerned about sterility but are more likely to be concerned about the nature of the disease which requires operation, such as the possibility of cancer. They may be concerned about the occurrence of insanity and, finally, whether they admit it or not, they fear the damaging effects upon their sexual life.

In women past 50, hysterectomy, if abdominal, is often done for degenerating fibroids or endometrial carcinoma. The vaginal operation is most frequently done for prolapse with associated relaxation of the pelvic floor. Women in this group fear cancer most. Also, since sexual activity apparently respects no age limit, the fear of the loss of it may still constitute a problem.

These emotional conflicts arise from many sources, and from the patient's point of view they are fully justified. If the gynecologist himself does not attempt to understand and relieve them, they will certainly grow in the time between the diagnosis and the operation. The patient who is advised to have a hysterectomy may begin to wonder whether or not the operation is really necessary. She will tell her husband what has been advised, and both of them may discuss the problem with their friends. Some of these friends will have read a magazine article which proves that in many cases hysterectomies are unnecessary. Other "family consultants" may inquire if x-rays have been made or the latest "cancer test" been done. They may advise radium or x-ray treatment and subtly suggest that there is some new test or treatment, some magic drug which has made the operation obsolete. Some kind friend will probably point out that the surgeon is much too old, or too young, that he may not be fully qualified to do the best type of operation, or that he may not be willing to disclose the true facts relative to the pathological report and prognosis. The patient is fortunate if this is all the advice she receives from her friends and family; for sooner or later she is almost sure to be warned by a raconteur of horrible instances of missed diagnosis, anesthetic complications, insanity, or sudden death.

All such talk tends to increase preoperative apprehension and postoperative anxiety to such an extent that they present a real problem to the surgeon. It is a problem, however, which he can and should handle. As the problem varies with each individual patient, its handling probably varies with each gynecologist.

In my years of practice, I have learned to consider every patient both as a medical and a psychosomatic problem. With this in mind I make sure that every gynecological patient has an adequate history and a complete physical examination. The modus operandi varies in individual cases, depending upon whether the patient already has been studied completely by a competent physician or whether she has been referred to me for complete medical and gynecological studies. As to the pelvic examination, such additional studies as biopsy, Papanicolaou smears, and routine vaginal smears should be done. Detailed studies of other systems should not be overlooked. When I have satisfied myself that hysterectomy is indicated, I try to evaluate the patient's emotional make-up before advising her of the urgency of the operation. A re-examination a week later may be reassuring to the patient and often revealing to the examiner. When once I have made my decision known, I explain as clearly as possible the reasons supporting my advice; and I try to answer as many questions as possible before they are asked. In certain unusual cases, the suggestion of consultation with some well-known gynecologist might be reassuring to the patient and her family. It has also been helpful to me. When the question of cancer arises, I assure the patient that all tissue removed will be thoroughly studied by the pathologist and that she will be told whether she does or does not have the disease.

On this last score some of my friends disagree with me, feeling that the patient should be spared the knowledge that she is suffering from a possibly incurable disease. Personally, I am convinced that most of us can adjust to any situation, honestly presented, better than we can live in a state of uncertainty. Also, a physician who has gained the reputation of presenting the facts, no matter how unpleasant they may be, may do much to relieve the suffering of those whose fear of cancer is unfounded. If the uterus, tubes, and ovaries are removed, I consider it wise to talk to the patient and her husband together, explaining to them the reasons for such extensive surgery, and discussing what the surgical menopause entails. I assure them that present-day hormone and other therapy makes it possible to relieve much of the discomfort which might otherwise be expected.

In these ways, the gynecologist may relieve the anxiety of his patients without making any attempt to pose as a first-class psychiatrist. It is thus obvious that the problem posed by the publicity given the revealing and valuable studies of hysterectomy is not unsolvable.

On the positive side, the studies conducted during the past 10 years by Drs. Miller, Doyle, Lock, Mauzy, Donnelly, and others undoubtedly have improved the practice of gynecology. In concluding her article for the *Ladies' Home Journal,* Lois Mattox Miller asks the question which is in the minds of her readers: "What can be done to stop unnecessary operations by hasty and incompetent physicians?" Dr. Lee, she pointed out, had suggested that a consultation of competent gynecologists be required before a hysterectomy could be performed. This was, in effect, the decision of the joint committee on hospital accreditation. The various obstetrical and gynecological organizations, through their committees, felt that this solution created as many problems as it solved. They agreed, instead, to the system under which we are now working whereby each hospital is advised to maintain an active tissue committee. It urges surgeons to have more consultations, especially in cases of serious illness and those in which the diagnosis is obscure. It also urges more complete preliminary records which indicate the necessity for surgery.

In conclusion, ten years have passed since Miller first startled the readers of the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY with the question, "Hysterectomy—Therapeutic Necessity or Surgical Racket?" Are we now in a better position not only to answer that question but also to evaluate the results which followed its asking? Three things stand out: First, as representative gynecologists we should keep abreast of the medical literature, availing ourselves of the good suggestions for improved service to our community and our patients. Second, as responsible staff members of the various hospitals we should recognize our responsibility in maintaining our high standards of practice. To do this it is necessary to recognize the value and emphasize the importance of our tissue committee. Only by good management on our part can we avoid the possibility that some qualifying agency may make the rules. If we fail to keep our own house in order we might even find ourselves subject to government regulations.

Finally, as practicing physicians we should deal with our patients as human beings, not cases, considering their emotions as well as their physical abnormalities. Unless we do this ourselves the patient and her family may turn more and more to popular magazines, which often present well-known medical facts but with a distorted interpretation.

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THE TEACHING OF GYNECOLOGIC CANCER THERAPY TO THE PHYSICIAN*

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THE therapy of gynecologic cancer has not maintained its proper relationship to the field of diagnosis in the gynecologic patient. During the past decade, many notable advances have been made in the diagnosis and methods of treatment of this disease, and a vast literature has accumulated. However, the dissemination of this knowledge to the medical student, the resident, the practicing physician, and even the gynecologist has been directed more to the diagnostic aspects than to the understanding of methods of therapy that must logically follow discovery of cancer in the patient.

This is in no way to underestimate the tremendous value of the earliest possible diagnosis of carcinoma of the female and its ultimate value to the complete cure of the patient. Much has been written and more has been spoken to sensitize the patient and physician to the fact that, in most instances, the earlier the diagnosis is made of female genital cancer, the more favorable the prognosis. These statements assume that correct and adequate treatment is instituted at once and carried through until the complete cure is obtained. Thus, early diagnosis is only a part of the complete cure—as proper therapy also bears a great responsibility. Studies of methods of therapy reveal that correct techniques are not always used. The purpose of this presentation is to show how our teaching and attention must be directed toward a more thorough understanding of the basic methods of treatment, just as soon as the disease is found.

Porter and Sycamore,[1] in estimating the five-year survival in cervical carcinoma, have indicated that improvement in technique and therapy with larger doses of radium have increased the survival rate from 23 to 48 per cent. This has been substantiated by others,[2] and factors such as delay in proper therapy, underdosage or overdosage of radioactive agents, inadequate or improper surgery bear an equally important relationship to the ultimate prognosis, as does the early diagnosis of pelvic cancer. In an analysis of 1,061 cases of carcinoma in the female in the Department of Obstetrics and Gynecology at the Ohio State University, in a seven-year period, 1948-1955, it was found that 25.3 per cent of the patients admitted to our cancer clinic in the hospital have had previous inadequate therapy or management of treatment at other institutions.

An analysis of these inadequacies serves to illustrate that in most instances the failure in proper therapy was due to a lack of knowledge of

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techniques of irradiation therapy, to overzealous surgical approaches, or to failure to understand the complications that can occur with radioactive agents. Further investigation showed that the physicians managing these patients had often acquired their knowledge by exposure to an apprentice-type system of training. This results in little knowledge of the principles underlying the treatment being administered and shows that the management of the condition is done by rote.

In the recent American Board of Obstetrics and Gynecology Examinations, it was surprising to learn that many of the applicants for certification in this specialty had a total lack of knowledge of radioactive substances, average amounts of irradiation, methods of application, metastatic sites of pelvic cancer, complications of overirradiation, or even of the definition of mg. hr. (milligram hours) of radium or gamma roentgens. When questioned as to how they managed their patients once the diagnosis of carcinoma had been made, their reply, all too often, was they "refer the patients to the radiologist for radiation therapy or to some surgeon for an operative procedure."

To what factors is this lack of knowledge of cancer therapy due? Is it apathy or difficulty in understanding methods of therapy, indifference to the possibilities of treatment, lack of interest, or, finally, resignation to the eventualities that can occur? The questions are difficult to answer as any one or combinations of these factors may be the basic causes of failure to give the proper therapy to the individual patient. To arrest or cure the neoplasm, Schmitz[3] has stated that the physician must have an adequate knowledge of: (1) the pathology of tumors, (2) radiation physics, (3) pelvic anatomy, and (4) surgical procedures.

We concur with these concepts and believe that all physicians should have some understanding of these principles if we are to succeed in the lowering of mortality of cancer in the female. This must be accomplished by a more definitive and enlightened program of education in the treatment of carcinoma of the female, beginning at the level of the medical student and carried on into his internship. Then further knowledge of these factors would depend upon his career as a resident and specialist in gynecology or as a general practitioner and referring physician.

Based on the previously stated causes of failure to understand cancer therapy in the female, the Department of Obstetrics and Gynecology, College of Medicine at Ohio State University, has initiated and is developing the following programs to overcome these deficiencies. They are incorporated in the complete program of teaching for students, residents, and practicing physicians. None of the essential subjects of the department are excluded, as they are integrated in such a manner that a careful check may be made to see that all the following phases are carried through to completion:

I. Teaching of Cancer Therapy to the Medical Student.—

1. Pathology of tumors:

A. Lecture course in the second year on obstetric and gynecologic topics, including cancer of the female.

B. Twice weekly seminars of gross and microscopic pathology, including all cancer lesions of the female, for a full quarter in the fourth year.
C. Assistance at operations and examinations of surgical specimens removed.
D. Twice weekly attendance at the tumor clinic.
E. Presentation of cases at weekly tumor conference.
F. Ward rounds on the tumor service.

2. Radiation physics:

A. Weekly tumor conference meetings including basic definitions of physics, the ionization action of radioactive materials, fourth year.
B. A study outline of all types of pelvic cancer including the principles of treatment in each type as outlined by the Department of Obstetrics and Gynecology.
C. An explanation of various applicators of radioactive materials by the use of x-ray to show the proper technique and the relation to visceral structures such as the bowel and bladder.
D. Twice weekly attendance at the tumor clinic (fourth year).
1. Explanation of the purpose of the clinic.
2. Demonstration of the methods of IBM coding and statistical study of all patients and their therapy.
E. Weekly conferences with the radiologist (fourth year).
1. Explanation and observation of the use of the 250 kv. machine.
2. Preparation of radioisotopes, applicators, and nylon threading.
F. Assistance in the operating room in application of radioactive material, with emphasis on the methods, and safety precautions taken for the patient, the operating room personnel, and himself.

3. Pelvic anatomy:

A. Participation in the routine pelvic examination (performed in the operating room in the second medical school year).
B. Twice weekly tumor clinics (fourth year).
C. Examination of patients in the diagnostic cancer clinic and in the follow-up clinic after therapy.
D. Surgical assistance in the operating room on all gynecologic patients.
E. Applied anatomy.
F. Instruction in the use of the colposcope.

4. Surgical procedures:

A. The teaching of surgical technique in the operating room (second year).
B. Assistance with gynecologic operations including radical Wertheim hysterectomy, colostomies, and all minor and major surgery (fourth year).

II. Teaching of Cancer Therapy to the Intern.—

1. Pathology of tumors:

A. Participation in residents' obstetric and gynecologic pathology course during the full year of internship.
B. Study of surgical specimens removed at operation.
C. Assistance at all gynecologic operations.

2. Radiation physics:

A. Participation in tumor conference.
B. Participation in residents' course in radioactive materials by hospital physicists.
C. Assistance at all operative procedures.

3. Pelvic anatomy:

A. Surgical assistance in operating rooms.
B. Pelvic examination of clinic and hospital patients.

4. Surgical procedures:

A. Assistance at all gynecologic operations.
B. Pre- and postoperative care of all cancer patients.

III. Teaching of Cancer Therapy to the Resident.—

1. Pathology of tumors:

A. Residents' course in obstetric and gynecologic pathology, twice weekly conferences throughout the year for the duration of the four-year residency.
B. Four-month service in the Department of Pathology, the examination, cutting, study, preparation, and diagnosis of all surgical specimens.
C. Twice weekly attendance at the cancer clinics.
D. Assistance at operations and operating upon gynecologic patients.
E. Attendance at tumor conferences and presentation of cases.
F. Observation and examination of cured patients in the follow-up clinic.

2. Radiation physics:

A. Residents' course in physics and radioactivity, given by the hospital physicist for six weeks each year.
B. Study of residents' manual on loading and using radioactive colpostats, tandems, and threads.
C. Application of ionization chambers in the rectum to calculate safety dosage to the bowel.
D. Instruction in loading applicators with radioactive material.
E. Aiding the hospital physicist in the calculation of gamma roentgen dosage.
F. Use of all radioactive materials in operative procedures.

3. Pelvic anatomy:

A. Residents' lectures and studies in applied anatomy (Department of Anatomy).
B. Twice weekly attendance at the tumor clinic in the fourth year of the residency and supervised direction of the clinic.
C. Pelvic examination of gynecologic patients admitted to the hospital.
D. Experience as first assistant and operator in all gynecologic procedures.
E. Instruction in use of the colposcope.

4. Surgical procedures:

A. Assistance at operation upon all gynecologic patients during the four-year residency.
B. Biopsy of cervical or uterine lesions in the clinic and hospital.

IV. Teaching of Cancer Therapy to the Attending Gynecologic Staff.—

1. Pathology of tumors:

A. Rotating services in tumor division and clinics.
B. Weekly tumor conference meeting.
C. Participation in all resident, intern and student teaching.
D. Teaching and auditing student courses in obstetric and gynecologic pathology.
E. Participation in pelvic cancer delay committee.

2. Radiation physics:

A. Participation in all student and resident teaching.
B. Appointment to radioactive departmental group when qualified.
C. Clinical uses of radioisotopes and radium.

3. Pelvic anatomy:

A. Rotation through tumor service and clinics throughout each year.
B. Use of the colposcope.
C. Examination of all clinic and hospital patients admitted to the gynecologic service.

4. Surgical procedures:

A. Experience as assistant and operator on tumor service.
B. Application of radioactive materials.
C. Responsibility as attending man on tumor and gynecologic service for operations, pre- and postoperative care.

V. Teaching of Cancer Therapy to the General Practitioner and Referring Physician.—

1. Monthly hospital staff meetings open to all physicians in the city and state.
2. Letters of acknowledgment to referring physicians stating the diagnosis and the treatment outlined on the referred patient.
3. Invitations to referring physician or general practitioner to be present at the operation upon the patient.
4. Personal contact or letter to physician at the end of the patient's therapy, detailing the treatment and recommendations for further care.
5. Invitation to come with the patient to the follow-up cancer clinic at her regular visits, or letters describing our findings at that time sent to him immediately after her visit.
6. Local meetings throughout the state with staff members from the Department of Obstetrics and Gynecology as the guest speakers.
7. Invitation to participate in pelvic cancer delay committee meetings.
8. Presentation of statistical summaries to the physicians showing the benefit of early and adequate therapy to patients who have gynecologic cancer.

Comment and Summary

We sincerely believe that the program just outlined will not only call further attention to cancer in the female and its early diagnosis, but will aid all physicians in helping to remove the doubts and uncertainty as to the benefit of early and adequate therapy. It should also help to eliminate the percentage of untraced patients and the haphazard method of planning and executing their treatment.

In the development of any program, the question must be asked, "What beneficial effects can be gained?"

Already short-range effects can be seen in our teaching of gynecologic cancer therapy that appear beneficial:

1. Combined with the teaching of early consultation in the discovery and diagnosis of cancer, it has brought about coordination of cancer teaching in general, largely through increased interdepartmental cooperation, in both the preclinical and clinical years.

2. It has reduced emphasis to the student and practitioner on the incurability of cancer.

3. It has attempted to reduce the many different terms used by radiologists and gynecologists that have made the therapy so difficult to understand.

4. It is giving the physician in all stages of training and practicing a more comprehensive concept of the disease.

5. It has stimulated the interest of the resident and the student in cancer research.

6. It has led to improvement in the medical service to cancer patients by more careful attention to the prevention of complications of therapy.

7. It has assisted in the development of cancer research in the cytology and isotope laboratories.

These short-range effects, however, are only a means to the far greater long-range objective of the teaching, and that is the reduction of cancer mortality. We hope that similar programs can be developed in other institutions, cities, and states. Only in this manner can the combination of early diagnosis and proper therapy of cancer in the female result in the cure to which all of our patients are entitled.

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DYSGERMINOMA COMPLICATING LABOR*

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(From Morrell Memorial Hospital)

DYSGERMINOMA comprises approximately 3 per cent of all primary malignant tumors of the ovary.[1] The purpose of this paper is to present a case which is even more unusual since it complicated labor. Mueller, Topkins, and Lapp[2] in a review of 427 cases in the literature reported 11 cases of dysgerminoma occurring in association with pregnancy, and, of these, only 6 complicated labor. Dougherty and Lund,[3] in a fifteen-year review of the literature, found 30 cases of solid ovarian tumors complicating pregnancy, and, of these, there were 9 dysgerminomas, 4 of which complicated labor. Since these reviews there has been no case reported complicating labor.

Case Report

A 25-year-old gravida ii, para i, was admitted on March 26, 1952, after 8 hours of labor. She had been examined early in labor and again one hour prior to admission when contractions were quite intense. At the latter examination a tumor was found to be blocking the birth canal. The history of her pregnancy disclosed considerable soreness of the lower abdomen, attributed by her to "pressure." However, she complained of continual pain on admission. Menses had been regular. Her previous pregnancy was entirely uneventful, terminating with spontaneous delivery.

Physical examination was normal. The blood pressure was 110/70 and pulse 108 per minute. The patient was found to be having contractions at 4 minute intervals and of 35 seconds' duration. The uterus relaxed well between contractions. The fetus presented by the vertex which was not engaged, and the fetal heart tones were of good quality. The cervix was dilated 6 cm., soft and 0.5 cm. thick, being displaced anteriorly by a large rubbery mass filling the cul-de-sac.

The preoperative diagnosis was: solid ovarian tumor; normal intrauterine pregnancy at term; active labor.

A lower segment cesarean section was performed and the patient was delivered of a normal infant. Following closure of the uterine incision, inspection revealed a large, well-encapsulated, slightly lobulated, rubbery pinkish-gray tumor of the right ovary. There was no abnormality of either broad ligament. The left ovary was normal. Because of the gross appearance of the tumor and the fact that the cut surface was pale grayish white with bulging of this surface above the capsule of the bisected tumor, a tentative diagnosis of fibroma was made. On this presumption, a right oophorectomy was done.

The postoperative course was uneventful except for an abscess at the site of one of the hypodermic injections.

Pathology Report.—Gross: The specimen consisted of an ovarian tumor which was well encapsulated, smooth, slightly lobulated, measured 14 by 12 by 11 cm., and weighed 360 grams. It was hard, rubbery, and grayish white on cross section. *Microscopic:* The cells were large and round with abundant pale-staining cytoplasm and large dark-staining nuclei. There were connective-tissue strands with lymphocytic infiltration of the stroma. *Diagnosis:* dysgerminoma.

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Follow-up.—The patient was cautioned about the need of follow-up and, though she has been examined repeatedly, there has been no evidence of recurrence. She was last seen on Dec. 2, 1955.

Fig. 1.

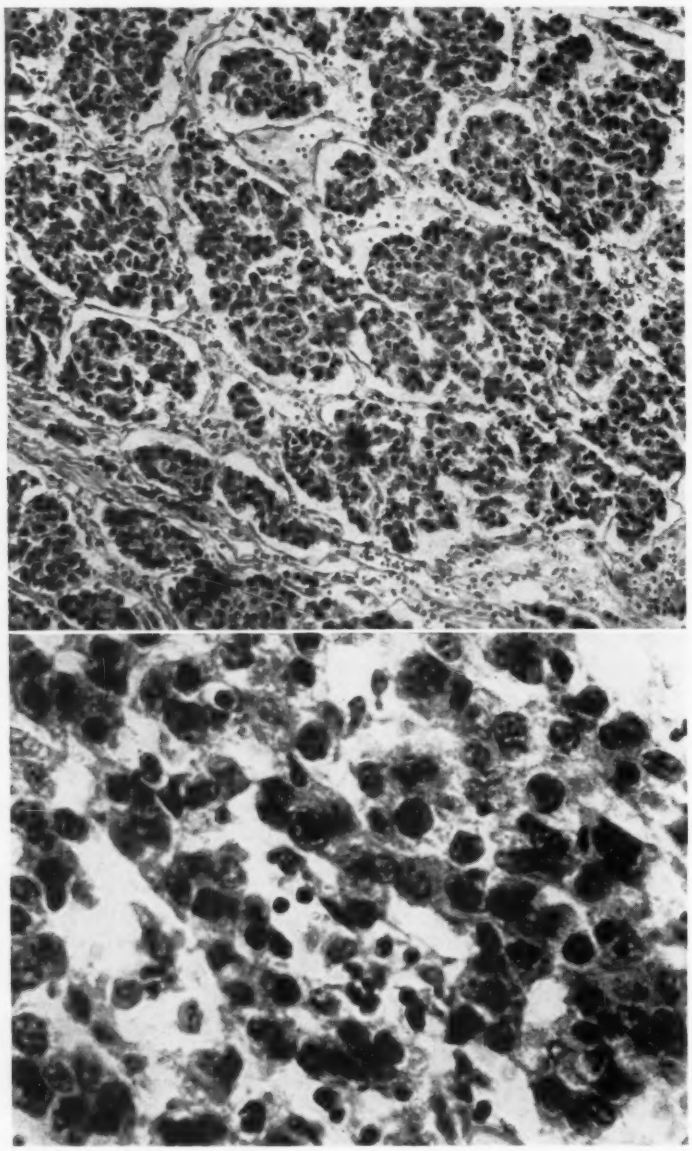

Fig. 2.

Fig. 1.—(No. 52-1583.) Low-power magnification of typical cellular arrangement of dysgerminoma and connective-tissue stroma with lymphocytic infiltration.

Fig. 2.—(No. 52-1583.) High-power magnification. Note darkly staining, large nuclei, pale-staining cytoplasm, and variability of cellular contour, typical of dysgerminoma.

Comment

It has been generally conceded that these tumors arise from cells associated with the undifferentiated stage of gonadal development, as first suggested by Robert Meyer.[4] These "neuter" cells are incapable of producing altered

hormonal effect. Most of these tumors grow rapidly and quite frequently outgrow their blood supply, resulting in varying degrees of necrosis, but no gross evidence of necrosis was found in the case presented. Typically, these tumors are described grossly as having a rather dense capsule which is smooth. The cut surface is described as appearing grayish pink, and not infrequently there are yellowish areas. Microscopically they vary widely in the number of connective-tissue septa, from rather dense stroma to sparse connective-tissue strands, with lymphocytic infiltration (Figs. 1 and 2). The large rounded cells of this tumor, with their abundant pale-staining cytoplasm and large, darkly staining nuclei, are quite typical.

The mortality rate is variously reported as ranging from 18.8 per cent (Döderlein) to 70.6 per cent (Pedowitz and Grayzel[5]), this based on 5 year survival. Mueller, Topkins, and Lapp in their review of the literature have reported a 5 year cure rate of 27.3 per cent. It is generally agreed that the degree of malignancy is greater than was formerly reported.

The most frequent symptoms are pain over the lower abdomen and abdominal enlargement. In association with these, there may be nausea and vomiting, probably due to irritation of the serosa occasioned by necrosis. It is readily understandable that these symptoms might mean little accompanying pregnancy.

Ascites, in varying amounts, is reported as being present in approximately one-third of the cases. It may vary from straw colored to bloody and, when bloody, it appears from the cases reported that the prognosis is poor. In the case presented there was no ascites.

Since these tumors occur most frequently in the second and third decades, the natural tendency has been toward conservative treatment. In the cases reported in the literature, operative procedures have varied from simple extirpation to the more radical total hysterectomy and bilateral salpingo-oophorectomy. Opinion is uniform on the advisability, in the event that the less radical approach is taken, of close follow-up, with a more radical surgical attack and possible x-ray therapy should recurrence be evident.

Summary

A case of dysgerminoma of the ovary is presented which was considered unusual because it complicated delivery of a term intrauterine pregnancy. Delivery was effected by low segment cesarean section and a right oophorectomy was done. The patient is alive and physical findings are normal four years after operation.

A brief summary of the literature is presented, in which the trend is found to be a more radical surgical approach regardless of the age of the patient, for as more cases are reported and followed the degree of malignancy is considered greater than formerly.

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TWIN PREGNANCY WITH ONE TWIN BLIGHTED*

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THIS condition is neither new nor uncommon in the literature. Pliny described it around A.D. 70. Kindred,[1] in an excellent review of the literature, analyzed one hundred and fifty cases. The majority of these cases were the typical fetus papyraceous type. Only ten fetuses were not flattened and well preserved. Seven of these had dichorial placentas. Others[2-11] have reported more recent instances of fetus papyraceous.

M. T. was a 25-year-old white married woman, para ii, gravida iii, at term on Jan. 12, 1953. The prenatal course was entirely uneventful. There was no history of threatened abortion or viral infection. On Jan. 3, 1953, she went into labor. She was admitted to Doctors' Hospital, Coral Gables, Florida, and, after a two-hour labor, she delivered spontaneously a 5 pound, 11 ounce female child in good condition. The placenta was expressed without difficulty, revealing a dead fetus of about four months' gestation with intact membranes.

Dr. Max Sayet, the pathologist at Doctors' Hospital, described the placenta and fetus as follows: "The specimen consists of a dichorial placenta, measuring 20 cms. in diameter and 6 cms. in thickness. The viable placenta measures 13 by 15 cms. in diameter. This portion appears entirely normal with complete cotyledons and no signs of necrosis or calcification. To one side of this placenta is a whitish, hard ischemic area that measures 5 by 8 cms. in size. The maternal surface is of a yellow fibrous nature. The fetal surface has a glistening whitish appearance. There are no viable villi on the maternal surface. There is a distinct margin between this and the viable placenta. Attached, near the center of the fetal placenta, is the umbilical cord, which is rather long, measuring 25 cms. [Fig. 1]. The cord is wrapped around the neck of the fetus two times. The chorion and amnion are intact and contain about 45 c.c. of a clear amber fluid. Attached to the cord is a well-preserved non-flattened fetus with a crown-rump length of 17 cms. The features are well preserved and no gross abnormalities are noted. The skin is intact and no evidence of maceration is present." Unfortunately, no microscopic examination of either the fetus or placenta was performed.

My first impression when the placenta was delivered with this well-preserved fetus was that the patient must have become pregnant again when she was 4½ months pregnant. I was sure that the only possible explanation was superfetation. After some study of the literature, however, I favor the theories set forth by Crosman[12] that, first, with intact membranes the amniotic fluid is a sterile medium which apparently has excellent preserving qualities. Second, he noted in rats that underdeveloped fetuses were better preserved than more mature fetuses which were retained in utero for the same period of time. He contended that, as fetal life progresses, enzyme activity becomes more progressive; therefore, the more mature the fetus the greater the maceration. Kindred[1] suggested that the dead fetus may be surrounded by a fluid of maternal origin which replaces the liquor amnii, and this preserves the fetus in an embalmed state. He also mentioned that cord complications were present in over 40 per cent of the cases he reviewed and might be a cause of death of one twin. Browne[13] attributes the cause of death of one fetus to reversal

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of the circulation in the hypogastric arteries of the weaker twin by a stronger companion, so that its placental circulation is brought to a standstill, with resultant death of the weaker twin. It is also of interest that almost none of the mothers showed any ill effects from harboring a blighted fetus for such a long time.

Fig. 1.—Shows placenta of viable term fetus and attached smaller placenta and stillborn fetus.

Summary

This is a case report of a white woman who delivered a normal child, followed by a blighted twin of 4 months' gestation which was exceptionally well preserved.

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DOUBLE VAGINA AND UTERUS UNICORNIS; REPAIR OF VAGINA, AND SUBSEQUENT TERM DELIVERY*

Report of a Case

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CONGENITAL anomalies of the female reproductive system are naturally of great interest to the obstetrician. The overwhelming majority of such anomalies are explained on the basis of asymmetrical development of the Müllerian ducts, incomplete fusion of the ducts, or both. Titus[1] believed that uterine anomalies occurred much more frequently than was generally recognized; and Baker and his associates[2] found an incidence of 0.3 per cent in their series of cases. True uterus unicornis, on the other hand, is considerably less common, having been reported only thirty-two times.[3-6] This anomaly is associated with abnormalities of the urinary tract in a high percentage of cases.

Baker found an increased tendency to spontaneous abortion in cases of incomplete doubling of the uterus but this was not true in uterus didelphys and uterus unicornis. There were more instances of fetal malposition, premature rupture of the membranes, and premature labor in both these types of anomalies; and fetal mortality was increased. Manual removal of the placenta was required more often than usual, and fetal anomalies were more frequent. Vaginal delivery was found to yield better fetal salvage than did delivery by the abdominal route.

I. R. S., a 20-year-old nulliparous married woman, presented herself on Jan. 27, 1951, with the chief complaint of dyspareunia since her marriage one year previously. This she described as a burning discomfort in the vagina during coitus and a feeling as if the vagina were too tight. Her general physical examination was normal throughout. On pelvic examination the external genitals were normal. Examination of the vagina showed a complete and intact septum extending from the hymen to the cervix. The vaginal passage on the left was slightly larger than the one on the right. There were two cervices, the one on the left being fairly well developed and the one on the right being quite rudimentary in appearance. Bimanual examination disclosed what was thought to be a single uterus of infantile size and configuration. Both ovaries were palpable and were normal.

The patient entered the hospital, in July, 1951, for additional study and vaginal plastic surgery. An intravenous urogram showed no associated anomalies of the urinary tract. Culdoscopy was attempted, but because of the inexperience of the operator with the instrument at that time, nothing was visualized except small bowel and omentum. The cervical canal on the left was dilated easily with a Hegar dilator and exploration of the uterus with a sound revealed a fusiform cavity 2 inches in length. All attempts to probe

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the canal of the right cervix were unsuccessful, the canal apparently terminating blindly about 1 cm. above the external os. Seven cubic centimeters of Rayopake was injected without difficulty into the left cervix and an x-ray taken. As shown in Fig. 1, the left cervix was continuous with a typical uterus unicornis. The Fallopian tube was visualized throughout its length and there was an obvious spill from the fimbriated end of the tube. Attempts to inject the dye into the right cervix were unsuccessful, the dye returning around the cannula and on the subsequent film none was visualized above the cervix.

Under general anesthesia, with the patient in the lithotomy position, Kelly clamps were placed on the anterior and posterior insertions of the septum, and the intervening septum excised. Additional clamps were placed above the first pair, and the procedure was repeated until the vaginal vault was reached. The clamps were not replaced with

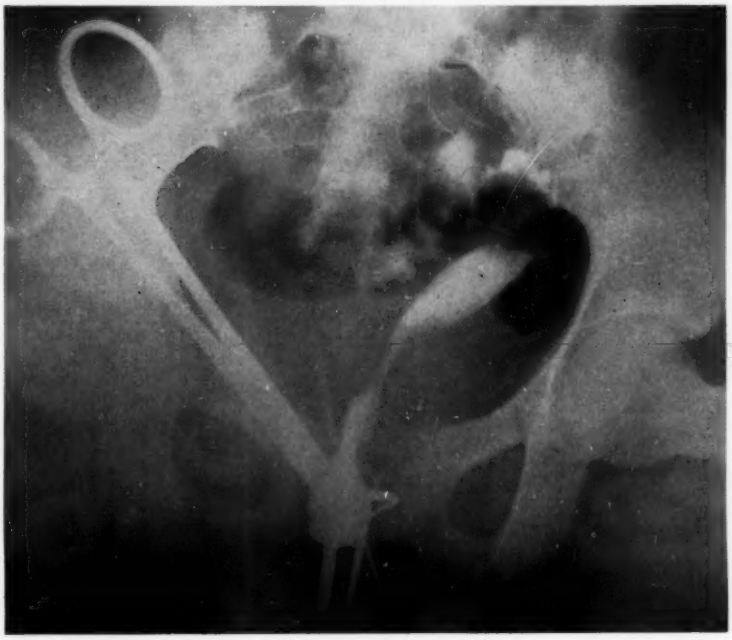

Fig. 1.—Hysterosalpingogram shows typical fusiform uterine cavity. The tube is visible throughout its length, and there is obvious spill of contrast medium from the fimbriated end of the tube.

sutures for fear of either shortening the vagina or penetrating the bowel or the bladder, but were left on and the patient returned to the ward (Fig. 2). Six hours later the clamps were removed without untoward result. A Foley catheter was kept in the bladder for three days after the operation.

The postoperative course was uncomplicated except for a persistent pneumoperitoneum from the culdoscopy. Diaphragmatic pain lasted for ten days and then gradually subsided. The patient was discharged from the hospital on the fourth postoperative day otherwise in good condition.

Postoperative examination one month later showed the vagina to be well epithelized where the septum had been excised, with a barely perceptible ridge running lengthwise of the anterior and posterior walls of the vagina. Two months later she reported that she was able to have intercourse without discomfort.

In December, 1953, two and one-half years after the operation, the patient came to the office and stated that she had missed two menstrual periods and was suffering from a moderate degree of nausea and vomiting. She had no abdominal pain or other symptoms.

Fearing the possibility of a pregnancy in the rudimentary uterus, she was admitted to the hospital for pelvic examination under anesthesia. The findings were consistent with a pregnancy occupying the uterus on the left. The uterus on the right was felt to be a small structure about the size of a walnut coming off from the left uterus just above the level of the cervix. It was thought that the pregnant left uterus was developing normally and she was seen at regular intervals.

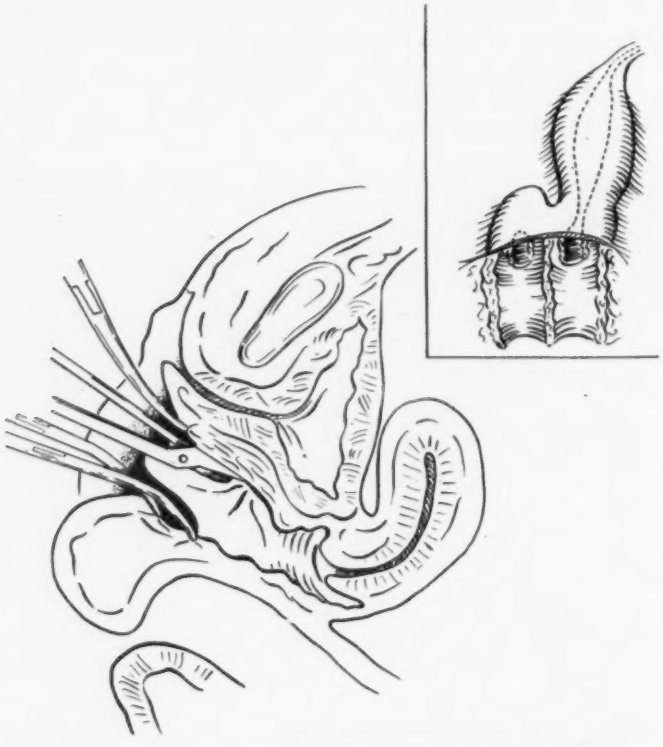

Fig. 2.—Technique of excision of vaginal septum. Kelly clamps are placed on the anterior and posterior insertions of the septum, and the intervening septum excised. Additional clamps are placed above the first pair, and the procedure is repeated until the vaginal vault is reached. Clamps are removed six hours later.

The pregnancy progressed uneventfully with the exception of a mild pre-eclamptic toxemia at the thirty-ninth week. The fetus occupied the left occipitoanterior position throughout pregnancy and x-ray pelvimetry disclosed no evidence of cephalopelvic disproportion. The patient went into labor spontaneously on July 14, 1954, during the forty-first week of her pregnancy. On admission to the hospital the fetal head was deeply engaged in the pelvis and rectal examination showed the cervix to be completely effaced and 1 cm. dilated. Cervical dilatation was progressive, and after a first stage of eight hours dilatation was complete. The second stage lasted one hour and eleven minutes and was terminated by spontaneous delivery over a right mediolateral episiotomy. The infant, a 7 pound, 2 ounce male, was in good condition. Careful inspection of the vagina and cervix showed no lacerations and the episiotomy was repaired without difficulty. The postpartum course was entirely uneventful. Pelvic examination, at six weeks post partum, revealed the perineum to be well healed and well supported. The vagina was ample in depth and lumen. The cervix was intact, with only minimal erosion; the uterus well involuted. Since then the patient has been well. She has complained of no dysmenorrhea, dyspareunia, or menstrual irregularity, and the child continues to develop normally.

Summary and Conclusions

A case of double vagina, with associated uterus unicornis has been reported. An operative technique for correction of the double vagina is described, which to my knowledge has not been previously reported. Subsequent term vaginal delivery was accomplished.

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CARCINOMA OF THE CERVICAL STUMP, UNUSUAL CASE (SPRAY CARCINOMA)*

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THE majority of pathologists and gynecologists believe that the first step in cervical carcinogenesis is its origin in a short row of basal cells that assume a carcinomatous character.

Ordinarily the normal basalis reproduces the higher zones and layers of the normal stratified squamous epithelium. When carcinoma first originates in the basal cells, these malignant cells reproduce the more superficial zones of the epithelium also with carcinoma cells. These cells proceed toward the surface and cause disruption of the surface and ulceration in time, varying from several weeks to years.

One of the most important characteristics considered in making the diagnosis of invasive carcinoma is the breaking through of the basement membrane by the neoplastic cells.

The most common type of development of invasive cervical carcinoma is that in which the surface epithelium is completely replaced by malignant cells and after a varying length of time these malignant cells grow downward into the stroma.

Brooke Bland[1] postulated that there must be at least one more type of early developing carcinoma. This had to be characterized by speed of progress of the malignant cells arising in the basal layer *invading the stroma before appearing in the superficial layers of the epithelium.* By examining a large number of grossly normal-appearing surgical specimens, Schiller[1] was able to prove this theory and found two such cases. These cases are characterized by transformation of the basalis into carcinoma followed immediately by downgrowth into the stroma, while the higher strata of the epithelium remain entirely normal. The surface of the cervix gives no clue to the changes in the depths. These carcinomas of the basalis cannot be detected by colposcopy, Schiller test, or Papanicolaou smear. These cases ordinarily are discovered only by chance. When the invasion occurs by single cells in a brush-shaped structure, Schiller has applied the term "spray carcinoma."

The spray carcinoma should not be confused with a type of preulcerated invasive carcinoma described by Pund and Echols.[2] This type of malignancy is called "covert invasive carcinoma." The covert invasive carcinoma arises in a preinvasive carcinoma that has displaced the columnar epithelium of the endocervix and has invaded the deeper layers of the endocervix beneath the glandular epithelium. Seventy of these cases were reported.

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A clinically innocent cervix might also be found in this type of invasive carcinoma of the cervix but a part of the entire thickness of the cervical epithelium would be converted to preinvasive carcinoma and a positive cytology should be evident.

This case report deals with a spray carcinoma.

Mrs. H. M., a 50-year-old para i, gravida i, was first seen on Aug. 12, 1950, complaining of dyspareunia of ten years' duration. Her past history was significant in that in 1940 she had had a papillary adenocarcinoma of the left ovary treated by subtotal hysterectomy and bilateral salpingo-oophorectomy, followed by six x-ray treatments.

The entire physical examination at the time of her initial visit was essentially negative except for atrophic vaginitis. Cervical cytology at that time was normal.

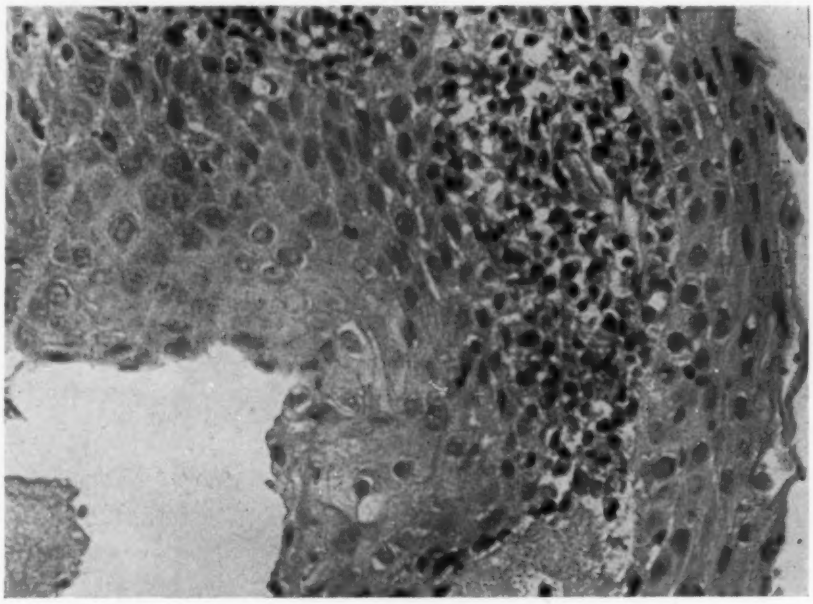

Fig. 1.—Photomicrograph of biopsy.

In the succeeding 4½ years, this patient was seen and examined in our office 21 times for atrophic vaginitis, mild chronic cervicitis, and mild menopausal syndrome. A total of 10 cervical cytologic smears were obtained from this patient, all of which were negative except one in May of 1953, at which time a precancer cell complex was reported by the Cancer Institute at Miami. At that time, a Schiller test was entirely normal and the entire cervix was cauterized without biopsy. Because of mild chronic endocervicitis, the cervix was recauterized in August of 1953 and, because it appeared slow to heal, the entire squamocolumnar junction was removed by punch biopsy in September of 1953. This biopsy was negative for carcinoma.

This patient was re-examined every two, three, or four months and on March 31, 1955, it was noted that the slight chronic endocervicitis had recurred. There was intact stratified squamous epithelium covering the entire portio with only mild chronic cervicitis at the squamocolumnar junction. Cervical cytology at that time was normal except for slight precancer tendencies. Because of the recurrent endocervicitis, a cervicectomy was advised. The patient was hospitalized on April 6, 1955, and prepared for excision of the cervical stump. After the preparation, it was noted that there was a small amount of fresh blood in the vagina and speculum examination showed at 9 o'clock a small crack in the surface

epithelium from which blood was oozing. This area was removed with a Gaylor punch and underneath the crack in the epithelium a 1 cm. necrotic, obviously malignant (Fig. 1) cavity was found (Figs. 2 and 3). Exploration of the endocervical canal disclosed no connection between it and the malignant cavity.

Cytologic smears obtained after the crater was broken through were definitely positive for carcinoma.

The patient was treated with radium and x-ray and at the present time there is no evidence of recurrence of the disease.

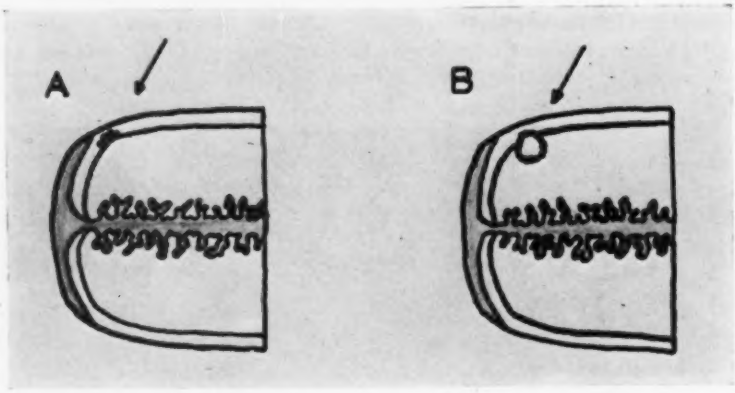

Fig. 2.—Schematic diagram of pathogenesis of lesion.

Fig. 3.—Photograph of cervix showing: *a*, Marker in cervical canal; *b*, bridge of tissue between lesion and cervical canal; c, deroofed cavity of lesion.

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SPONTANEOUS RUPTURE OF A UTERINE VARIX AT 28 WEEKS' PREGNANCY*

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SPONTANEOUS rupture of the veins of the uteroovarian system during pregnancy is an overlooked cause of sudden maternal collapse and sudden death. Hodgkinson,[1, 2] in an excellent review, reported 72 cases of spontaneous rupture during pregnancy. Jurishica and Gutglass[3] reported 2 additional cases and the present case makes a total of 75 cases found in the literature. Because of its infrequency, and because no trauma is involved, the diagnosis is seldom obtained. Nothing concerning this clinical entity is mentioned in most obstetric texts. Earlier cases were reported as medical curiosities rather than as complications of pregnancy. Indecision as to management can be tragic when the diagnosis is not made.

This patient was a 32-year-old primigravid white woman, a dietitian, first seen on Feb. 25, 1952, at 24 weeks' gestation, complaining of pain and swelling of the left leg. She had always had some varicosities, but the left leg had been worse since the onset of this pregnancy. The superficial thrombophlebitis responded to hospitalization, bed rest, and a continuous caudal block for 48 hours. She was discharged much improved in five days. Two weeks later, no edema was evident but there was noted some tenderness in the lower left quadrant. The fetal heart tones, blood pressure, etc., were normal.

She was next seen on March 29, 1952, at 28 weeks, for a prenatal checkup. There had been no leg edema or pain. Abdominal examination showed the uterus to be sharply deviated to the left and the possibility of a congenital defect of the uterus was noted. Four hours after leaving the office, she had sudden pain in the lower left quadrant, followed by marked weakness, sweating, and lassitude. There was no vaginal bleeding. She was referred immediately to the hospital.

Physical examination on admission showed an extremely anxious individual in obvious discomfort. The blood pressure was 98/50; pulse 100. The general examination was negative except for the abdomen and pelvis. The uterus was enlarged to 24.5 cm. above the symphysis and was extremely tender to touch; there was a moderate increase in tone. The fetal heart tones were 160 per minute. On vaginal examination, the cervix was elongated, firm, and closed. There was no vaginal bleeding. The hemoglobin was 11.2 gm.; leukocytes 28,600; polymorphonuclear leukocytes 92; lymphocytes 7; eosinophils 1. The urine was negative. The blood pressure ranged from 104 to 88 systolic and 74 to 50 diastolic during the next two hours. Three hours after admission, there was a marked increase in the abdominal tone. Vaginal examination at this time showed no change in the cervix. No external bleeding was noted at any time.

After consultation, a diagnosis of abruptio placentae was agreed upon, and laparotomy was done four hours after admission. As the peritoneal cavity was entered, an estimated 1,500 c.c. of free blood was noted. No bleeding point was seen. A hand was passed over the surface of the uterus, and no abnormality was noted. Through a low transverse cervical incision, a 3 pound living fetus was delivered. The uterus was then brought into the abdominal wound and profuse bleeding was noted coming from a ruptured varix on the posterior surface of the fundus just medial to and below the insertion

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of the left tube. This was secured with a figure-of-eight suture, and satisfactory hemostasis was obtained. The uterus was noted to be bicornate with a very small right horn. The pregnancy had occupied the left horn. The uterine incision was closed in two layers and peritonized.

After twelve hours, the baby died of respiratory difficulty. The postoperative course was uneventful and the patient was discharged on the eighth postoperative day.

Follow-up hysterography elsewhere confirmed the bicornate nature of the uterus. The patient became pregnant again in December, 1952, and this pregnancy continued uneventfully until July, 1953, when, at 36 weeks, she was hospitalized because of vague lower abdominal pain. On the second hospital day, there was an acute onset of sharp low abdominal pain. Laparotomy disclosed a spontaneous rupture from the left angle of the old section scar up the left border of the uterus to the left round ligament. A living normal 5 pound, 4 ounce infant was delivered. The rent in the uterus was closed and the postoperative course was uneventful.

Review of the Literature

Spontaneous rupture of uteroovarian veins may be of three types: (1) *Intraperitoneal rupture.* This arises usually from vessels distributed over the surface of the uterus. The firm visceral peritoneal attachment prevents subperitoneal dissection of a hematoma, and spillage directly into the abdominal cavity occurs. (2) *Retroperitoneal bleeding.* This usually originates in a rupture of veins located in the folds of the broad ligament, which allows for dissection to the pelvic diaphragm below and up to the thoracic diaphragm above. (3) A combination of the two may occur.

The etiology is speculative. Rupture has occurred as early as the tenth week of pregnancy or as late as twenty-one days post partum.

Sixty per cent of these ruptures are associated with labor. The average age was 28.6 years; 55 per cent were primiparas.

The exact incidence of varicosities of the uteroovarian veins is not known. In pregnancy, there is a definitely increased femoral vein pressure. The placenta, acting as an arteriovenous fistula, would help explain this. Therefore, increased venous pressure in connection with an inherent weakness of the vessel wall appears to be an important factor predisposing to rupture.

The broad ligament was the site of rupture in 78 per cent of the cases, the posterior surface of the uterus in 19 per cent, and the anterior surface of the uterus in 3 per cent.

The chief presenting symptom is severe abdominal pain, sudden in onset which may be confused with the onset of labor. It may be unilateral and in the back if there is retroperitoneal dissection. Peritoneal irritation is noted in about 50 per cent of cases, or whenever intraperitoneal spill occurs. Shock quickly dominates the picture.

The mortality in all reported cases is 46.6 per cent. The association of rupture with labor usually makes the prognosis more grave, because the mortality is 76 per cent in these cases. Blood replacement is mandatory, especially if shock is already present. Hemostasis is the most important part of the treatment. Section is practically always necessary to facilitate the exploration. Ligation of a ruptured vein is sometimes possible but hysterectomy may occasionally be necessary when the bleeding point cannot be identified. Antibiotics are advisable to prevent infection of the hematoma if one is present.

Acknowledgment is made of the follow-up notes given by Dr. Charles E. Darling of Detroit, Michigan.

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MASTOPATHY AS RELATED TO FUNCTIONAL UTERINE BLEEDING*

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DURING the course of clinical practice it had seemed to me that there was an unusually high relationship between the various mastopathies and functional uterine disturbances. In so far as the available literature was concerned, there seemed to be few *clinical* data to support or refute this impression. It was therefore undertaken to collect from hospital charts information that might lend support or denial to this clinical impression.

That there is an intimate endocrine relationship between functional change within the normal breast and normal endometrium has been well established and will not be a subject for major discussion. That there may also be the same interrelationship between benign mastopathy and functional endometrial disorder has also been fairly well established. A few pertinent remarks, however, might be made on these endocrinologic facts.

Estrogen secretions of the ovarian follicle play a major role in adolescent development.[1, 2, 3]

Both estrogenic and luteal hormones combine to produce physiologic changes after sexual maturity.[1, 3]

The anterior pituitary hormones are important not only to stimulate and maintain ovarian function but to activate lactation and are essential for the response of the mammary gland to ovarian hormones. Adrenal cortical influence may also induce changes in the mammary gland and endometrium.[1, 3, 5]

Pregnanediol determinations have been carried out in many cases of benign mastopathy. The levels were generally found to be low in mastodynia and adenosis and extremely low in cystic disease. Estrogen levels were usually normal or high.[8]

Many workers have reported pathologic changes in the mammary glands of animals, including cystic change and adenocarcinoma, resulting from prolonged overstimulation with estrogen.[4, 5]

When chemical assays of human pregnanediol and estrogen secretion are combined with the findings of animal experimentation, it seems probable that benign mastopathy results from prolonged estrogen stimulation or unopposed estrogen stimulation, in the sense that corpus luteum influences are absent or deficient. (Small amounts of testosterone seem to prevent the formation of cystic disease although not the milder forms of mastopathy—mastodynia and adenosis.)

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The solitary type of cystic disease is more than likely due to a temporarily high estrogen output unopposed by adequate corpus luteal function whereas the multiple small cystic form is more often due to moderate but prolonged hyperestrogenism.

It has been variously stated that women with benign mastopathies are several times more likely to develop breast malignancy.[6] There are edema and hyperemia in the endometrium of women with breast pain and the elimination of gynecologic pathology improves painful breast symptoms.[8]

It therefore seems that, with this elementary background in mind, some pertinent facts could possibly be derived from a historical investigation of the interrelationship between mastopathy and functional uterine disorders and that perhaps some microscopic interrelationship may exist that might lead the pathologist to suspect potential benign or malignant mastopathy from the appraisal of uterine scrapings.

From the beginning it was obvious that routine clinical histories obtained from hospital records were frequently inaccurate primarily by virtue of certain omissions. To counteract this shortcoming, supplemental forms were appended to all charts in question and it was from this additional as well as routine information that the following statistical material was collected.

This represents a preliminary study to determine whether a clinical relationship exists that would warrant further study in an effort to correlate a possible pathologic relationship.

For the sake of clarity the terminology for mastopathy is that used by the De Paul Hospital Department of Pathology. Puerperal infections were omitted. The term functional uterine bleeding includes all cases submitted to curettage in which the diagnosis was not connected in any way with pregnancy or uterine carcinoma.

The comparative surveys of charts in question were begun in 1954 and continued through 1955. To arrive at a comparable number of cases of breast carcinoma it was necessary to include cases from 1953 and the last six months of 1952. It was decided that, for the sake of conciseness of presentation, consecutive cases in any of the various categories would better present statistically the facts that we hope to bring out than cases during a given time period.

There were five major groups of studies. (1) 80 consecutive admissions for breast surgery proved to be benign mastopathy, and not including carcinomas or infections; (2) 80 consecutive cases reported to be carcinoma of the breast; (3) 80 consecutive admissions for functional uterine bleeding submitted to curettage; (4) 80 consecutive admissions to the Department of Internal Medicine of all women over the age of 13 years; (5) 80 consecutive admissions for major nongynecologic surgery in a group of female patients over 13 years of age, namely, the patients admitted for cholecystectomy.

From appraisal of Table I it seems significant that, although there was little statistical variation among all groups in so far as a history of gynecologic procedures is concerned, when we study the figures for the cases with a positive history of curettage for functional uterine bleeding, the group of patients admitted for nonmalignant surgical mastopathy showed from six to twelve times the historical incidence. Conversely, among those admitted for breast carcinoma, there was a historical incidence no greater than that of the two unrelated groups.

TABLE I. GYNECOLOGIC HISTORY IN GROUPS REVIEWED

	BENIGN MASTOPATHY	BREAST CARCINOMA	FUNCTIONAL UTERINE BLEEDING	INTERNAL MEDICAL DISEASES	CHOLECYSTECTOMY
Total cases	80	80	80	80	80
Number with gynecological history	43 (54%)	31 (39%)	x	37 (46%)	33 (41%)
Number with major gynecological history	28 (35%)	27 (34%)	x	33 (41%)	29 (36%)
Number with minor gynecological history	15 (18.6%)	4 (5%)	x	4 (5%)	4 (5%)
Number of curettages for bleeding	24 (30%)	2 (2.5%)	x	3 (3.75%)	4 (5%)

With this rather striking differential derived thus far, we set about to reverse the breakdown and search among the gynecologic and nonrelated groups for the incidence of nonmalignant mastopathy.

Here again, from Table II, it seems that there is a rather strikingly high relationship between the patients admitted for functional uterine bleeding and those with histories of nonmalignant mastopathies.

TABLE II. SUMMARY OF INCIDENCE OF MASTOPATHY

	FUNCTIONAL UTERINE BLEEDING	INTERNAL MEDICAL DISEASES	CHOLECYSTECTOMY
Number of cases	80	80	80
History of mastopathy	15	1	2
Puerperal surgical mastopathy	3	0	1
Nonmalignant surgical mastopathy	12	1	0
Malignant mastopathy	0	0	1
Nonmalignant history	15%	1.25%	0%

The next approach to the problem which we have undertaken is still in its comparative infancy. Working with the Department of Pathology we have attempted to search for any pathologic significance in breast and endometrial biopsy specimens submitted simultaneously during the course of routine surgery for mastopathy.

In searching back through the 24 month period beginning January, 1954, there were 8 patients who had curettages performed simultaneously with breast surgery. Together with this small series we have added 14 cases of endometrial biopsy performed at the same time as breast surgery. Autopsy material has been processed during the past 4 months. Among these are two cases of terminal breast carcinoma.

It is obvious that this number is too small from which to draw any conclusions. In 7 out of 8 coincidental curettages performed, secretory endometrium was obtained. Changes in glycogen content, referred to by way of histochemical investigation, have received special attention.[9, 10]

To the present there appears to be no significant histologic pattern exhibited by biopsy of either the breast or the endometrium which would be of value to the pathologist in seeking a clue to an interrelationship between the two frequent gynecologic problems.

Summary

Since January, 1954, case histories in all cases admitted to De Paul Hospital for either mastopathy or functional uterine bleeding have been reviewed and compared critically with a like number of cases of similar sex and age, but totally unrelated in so far as the primary illness (cholecystectomy and general medical) is concerned. An attempt was made to establish on the basis of clinical history that a high relationship existed between functional mastopathy and functional uterine bleeding.

Conclusions

1. To date no microscopic pathologic feature has been noted that would lead the microscopist to suspect mastopathy on the basis of uterine finding or conversely to suspect functional uterine disorder on the basis of breast changes.

2. There is an incidence of functional uterine bleeding many times as frequent among consecutive patients admitted for benign mastopathy as in consecutive patients admitted for an unrelated cause.

3. There is a history of nonmalignant mastopathy many times as frequent in consecutive cases admitted for functional uterine bleeding as in a similar series of cases admitted for unrelated causes (cholecystectomy, general medical).

4. The incidence of carcinoma of the breast was not associated with an increased frequency of functional uterine bleeding. This does not conform to the expected findings based on experimental production of mammary carcinoma in animals.[2]

The invaluable assistance of Dr. Arnold Straus, Department of Pathology, and Mrs. Helen Titus, Record Librarian, is gratefully acknowledged.

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Discussion

DR. T. BERT FLETCHER, JR., Tallahassee, Fla.—While studying the hormonal influences on the breast in Best and Taylor's book on physiology, I read that Prolactin, the lactogenic hormone secreted by the anterior lobe of the pituitary gland, arouses the maternal instincts in virgin rats. It also induces broodiness in hens. Riddle and his associates have shown that in from 5 to 12 days after a series of injections, the treated animals will care for their young. Now, why does it not work in the human female!

Mastopathy as defined as any disease or pain in the mammary gland. Puerperal diseases of the breasts and malignancies have been omitted and the author uses the term benign mastopathy.

Endocrine dysfunction is frequently associated with and may be responsible for certain benign lesions of the breast but there is no absolute proof that it is the only or direct

etiological factor. In chronic mastitis, adenofibrosis, and fibroadenoma, it can be concluded that the hormones are possibly involved, but other factors are also necessary for the production of the syndrome.

Taylor in 1936 came to the conclusion that a certain minimum activity of the ovary is necessary for the development of chronic mastitis, but there is no specific hyperfunction or hypofunction associated with mastopathy that could be proved by laboratory studies at that time. The conception of chronic mastitis as being primarily a vascular disturbance with changes in the interstitial tissues of the breast based on abnormal nervous stimuli explains many of the clinical aspects of the disease. The painful breast has from the clinical viewpoint a large nervous element. The pain radiates to the arm, neck, axilla, and lateral body wall. Pain is worse during periods of nervous tension.

In Dr. Byrd's study he found that patients with benign mastopathy had a positive history of curettage 6 to 12 times the incidence in unrelated groups. There is another factor that I think should be taken into consideration. Women who are admitted to the hospital for benign mastopathy are the type of patients who ask for good preventive and prophylactic medical care. This type of patient is much more likely to be admitted for functional uterine bleeding than you would expect in the general population or unrelated groups. Both mastopathy and functional uterine bleeding cases are the ones that are most often admitted to rule out malignancy. It is amazing to me that Dr. Byrd found in his second study only 3 women with a history of mastopathy in 160 female patients, 80 of them internal medicine cases and 80 cholecystectomy cases. I would have thought that the incidence in the normal population would have been much higher than that. In my office practice it seems higher which—of course—normally it should be.

The best form of endocrine therapy in all forms of chronic cystitic mastitis is normal pregnancy and lactation. Also clinically we practically never see mastopathy in the postmenopausal patient.

I believe this study is valuable in trying to determine further the hormone interrelationship between the breast, pituitary, and the ovary. Clinically we are using these theories in treating breast engorgement with hormones. Estrogens and testosterone are used to treat advanced mammary carcinoma. We are further utilizing these principles when we castrate patients with mammary cancer, using x-ray and oophorectomy in the premenopausal patient. These principles are important when we are asked to see a patient in consultation who has had mammary carcinoma and becomes pregnant again. It seems that the hormones would be very useful in the treatment of the various benign mastopathies, but frankly I have had little success. I would like to ask Dr. Byrd if he can outline a good plan of treatment for chronic mastitis.

DR. E. C. GARBER, JR., Fayetteville, N. C.—Dr. Byrd has attempted to prove statistically that a clinical relationship exists between functional uterine bleeding and benign mastopathy. Most of us think that this relationship does exist.

Of 80 patients admitted for benign mastopathy, 24, or 30 per cent, gave a history of curettage for functional bleeding. Conversely, of 80 patients admitted for functional bleeding, 12, or 15 per cent, gave a history of surgical mastopathy. These figures seem significant. As the functioning of the breasts runs parallel with that of the ovaries and the uterus, it is not unlikely that a disease process involving both uterus and breasts might have a common etiology.

The breast is periodically altered by ovarian function as demonstrated with puberty, pregnancy, and the menopause. It has been shown that the secretion of estrogen and progesterone is responsible for these changes. Apparently some imbalance in this mechanism is responsible for the mastopathy known as chronic cystic mastitis, as well as functional bleeding.

In view of experimental work it can be stated that chronic cystic mastitis is due to excessive estrogen stimulation or a decrease in an antagonist such as progesterone, androgen, or corticosterone.

Kier and Womack in 1952 studied 15 patients wherein breast lesions and endometrium were reviewed. The endometrium was normal in only 7 of these. They also did a chemical assay of breast tissue for hormone content and found a lower content of substances androgenic in action.

I talked to Dr. Womack, who is Professor of Surgery at the University of North Carolina, and he feels that the chemical assay was a crude test and that the results are not reliable. He did state, however, that he now has about 50 cases in which breast lesions and endometrium were studied simultaneously and that the endometrium was abnormal in a large percentage of these.

Therefore, from Byrd's clinical study and from Womack's pathological study, it seems quite likely that chronic cystic mastitis and functional uterine bleeding have a common cause, this cause most likely being a deficit of luteal formation in the ovary.

This paper brings up another interesting point and that is, "How far should the gynecologist go in the diagnosis and treatment of breast lesions?" The gynecologist probably does more breast examinations than any other physician. This has been particularly true during the past few years in connection with our cancer detection programs. When a lesion requiring surgery is encountered the patient expects her gynecologist to remove it as she knows him as a woman's surgeon. It is obvious that the breast is closely associated with obstetrics. Dr. Byrd's paper shows the intimate relationship to gynecology.

AFIBRINOGENEMIA*

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SEVERE uncontrollable hemorrhage associated with a failure of the blood to clot is a potentially disastrous complication of pregnancy. Attention was first drawn to this condition in 1901 by De Lee[1] who described it as a temporary hemophilia. The first demonstration of the nature of this defect of nonclotting blood was by Dieckmann[2] in 1936, who noted that there was a markedly reduced level of fibrinogen in patients who had hemorrhages following abruptio placentae. Since that time and particularly in the last five years many reports concerning the theory of the physiologic and pathologic processes causing the afibrinogenemia have appeared in the literature.

The purpose of this paper today is to present you with a review of the opinions obtained, as reported through December, 1955, and also to present three of the five cases we have had in private practice during a twelve-month period.

It is well recognized that the physiologic[3] role of fibrin is to form clots and arrest hemorrhage at local sites of trauma. Defibrination of circulating blood is generally considered pathologic. The failure of blood to clot in certain obstetrical conditions is due to a depletion of the blood fibrinogen. This is of great clinical significance inasmuch as the hemorrhage from afibrinogenemia is amenable to the specific treatment of replacing the fibrinogen.

Acquired afibrinogenemia, hypofibrogenemia, or fibrogenopenia with its resultant hemorrhagic diathesis has been reported as occurring in at least three or more situations in pregnancy. These include: (1) severe premature separation of the placenta (abruptio placentae); (2) amniotic fluid infusion or embolism; (3) long-standing retention of a dead fetus in utero; (4) convulsive eclampsia; (5) postpartum hemorrhage; (6) surgical trauma.

Other conditions which are probably associated with defibrination are bilateral renal cortical necrosis, pituitary necrosis, trauma forceps delivery, hydatiform mole, and incompatible blood transfusions.

The most significant hematologic change[4] which occurs in these patients is a defibrination of the blood. Schneider's[5, 6, 7] theory and demonstration of this pathologic process as it occurs in abruptio placentae are well known. Jackson, Hartmann, and Busby[8] are also of the opinion that this is the most likely explanation of the coagulation defect.

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Heaton[10] and Reid[9] agree that the physiology of blood coagulation is controversial and not entirely clear; in fact, it is almost impossible to make a statement regarding it without challenge. Therefore, any scheme which depicts the events in the mechanism or the failure of coagulation could be soon outdated.

Two possible explanations are:

1. Destruction of fibrin by fibrinolysin which is normally carried in the globulin portion of the blood.

2. The immobilization of fibrin by thromboplastic substances released in the blood stream with resultant intravascular clotting. These substances could enter the blood stream by amniotic fluid infusion and embolism.

Seegars has an abbreviated diagram of blood coagulation. It is the introduction of the thromboplastin from without into the blood which starts the blood clotting and utilizes the fibrinogen.

As stated by Reid,[11] three basic reactions are involved in clot formation. The first of these is the preparation or activation of thromboplastin from a precursor present in the circulating blood. Then the second reaction, namely, conversion of prothrombin to thrombin. The final step is formation of a fibrin clot through the interaction of thrombin and fibrinogen. In addition, normal clotting requires accelerator factors which are concerned with prothrombin conversion or utilization. A labile component is contained in the plasma while serum contains a more stabile component. Clotting may be delayed if these substances are not in normal concentrations. Also, substances may appear which will decelerate the clotting process or dissolve the clot which has formed. These factors are not normally detectable in the circulating blood but appear under stress and shock and with intravascular clotting.

In dog experiments it has been shown that when thromboplastic material was infused antithrombin was present in the circulation. This is apparently an attempt by the tissues of the body to protect themselves against further intravascular clotting following injury.

The ultimate fate of the fibrin which has been formed is still speculative. It is felt by many[12, 13, 14] that the newly formed fibrin is widely scattered by the rapidly moving blood stream and deposited in microscopic amounts throughout the vasculature. The fact that masses of fibrin are not encountered is visualized by Page as a result of 25 Gm. of fibrin being distributed throughout 60,000 miles of capillaries. From an autopsy report[15] of fibrin embolism it was found that the amount of fibrin present was microscopic and that it was distributed throughout several organs and particularly the arterioles of the pulmonary vessels.

Weiner, Page, Reid, and Schneider all postulated that fibrinolysis-like activity occurs whenever there is intravascular clotting for the purpose of maintaining the patency of the blood vessel by dissolving the clot. It is not known whether fibrinolysin is present at all times in the circulating blood but it is found in conditions of stress and in the presence of shock. This enzyme is probably produced by the endothelium of the capillaries whereas the antifibrinolysis is believed to be under the control of the pituitary, adrenocortical, splenic system.

The prothrombin activity has not been seriously affected by the intravascular clotting. In the majority of cases there has been reported a slight reduction in prothrombin[12, 14, 16] but in none of the cases reported so far has the level been low enough to cause hemorrhage.

Margulis, Luzache, and Hodgkinson[17] showed in their serial study on obstetric patients without complications that in normal labor and delivery (a) fibrinogen blood levels were not altered, and (b) prothrombin time, bleeding time, and clotting time remained within normal limits; (c) fibrinolysis was present in a majority of patients following delivery who did not have lysis ante partum. The observed lytic activity in these patients was never sufficiently increased to influence adversely normal clot formation. Several of the factors causing this increased fibrinolysis are muscular activity, fear, medication, surgical stress, and blood loss. Fibrinogen depression occurs in obstructed[3, 17] and severe labors.

Abruptio Placentae

Afibrinogenemia is seen most commonly associated with abruptio placentae. From Weiner's[16] coagulation studies over the last six years, done on all patients who bled in any stage of pregnancy, it was found that afibrinogenemia occurred only in the severe cases of abruptio placentae. This constitutes 5 to 10 per cent of all cases of abruptio placentae and 1 to 2 per cent of all pregnancy, and in the main they are considered severe separations if, in addition to bleeding, there are definite clinical manifestations such as abdominal pain, uterine tenderness with rigidity, and fetal distress or fetal death. Severe premature separation of the placenta has the dubious distinction of being the obstetrical complication with the greatest maternal risk.[1] Death may on occasion occur subsequently to renal and pituitary damage, but the vast majority of patients who succumb do so directly from shock associated with uterine hemorrhage.

In abruptio placentae a retroplacental hematoma is formed and coagulates in situ. The hematoma[18] is located within the decidua in a laceration of the decidual plate and is followed by degeneration and necrosis of the decidua. Tissue juices and tissue debris become mixed into the blood and escape back into the circulation, thereby introducing large doses of thromboplastin into the blood stream. Compression of the hematoma, uterine rigidity, and the arterial pressure which would be present if a cotyledon of the placenta were involved are probably the forces necessary to push this into the circulation.

Whether this accident is a single episode or whether it is a recurrent enlargement of the hematoma is of considerable clinical significance with regard to the management of the patient. Will there be, as Schneider[14] describes, an expanding process with repeated showers of minute increment of thromboplastin? Or as Weiner[16] describes, will rupturing the membranes lower the intrauterine pressure, thus relieving the pressure necessary to force further thromboplastin into the circulation?

It has been shown by Weiner, Hodgkinson, and others that abruptio placentae precedes fibrinogen depression and that the defibrination process was generally progressive as long as myometrial damage continued.

Inasmuch as these babies are usually dead before any definitive therapy can be instituted, treatment is directed toward preventing a maternal catastrophe. In the past, attention has been focused on the delivery of the patient and most of the writers favored cesarean section. With a new appreciation of this defect in blood clotting it should be possible now to outline a definite course of management for these patients. It is inviting disaster to make any attempt to deliver

them before a complete evaluation is made of the blood picture. The first step in management should be to evaluate the type and amount of separation with regard to the amount of blood loss and to ascertain if afibrinogenemia is present. Fibrinogen[3] values depressed into the subclinical defibrination zone (150 to 200 per 100 c.c. plasma) warn of impending difficulty. If conservative management is to be followed then serial fibrinogen studies are necessary to reveal the trend. Whole blood transfusion should be started at once to replace the blood loss and fibrinogen given to combat afibrinogenemia. Weiner's[6] patients required from 0 to 12 Gm. of fibrinogen and from 500 to 6,000 c.c. of blood. While the blood work is being done the membranes may be ruptured in an attempt to stimulate labor. Once the blood value has been restored and the afibrinogenemia corrected, the patient is then ready for delivery which should be prompt. The method of interruption should be based upon obstetric judgment as to whether cesarean section or vaginal delivery is indicated.

In the past it has been necessary on occasion to perform a hysterectomy to control the postpartum hemorrhage. If this hemorrhage is due to afibrinogenemia, the treatment is specific—fibrinogen should be given and a hysterectomy will not be needed.

Dead Fetus Syndrome

While attention has been focused on abruptio placentae; Reid[19] has reported the finding of afibrinogenemia in patients with dead babies that have remained in utero over a long period of time. These patients exhibit the same defect in blood coagulation as in abruptio placentae, and apparently the mechanism is the same with thromboplastin from the placenta and/or the decidua gaining access to the blood stream. The onset of defibrination is insidious and therefore may account for lack of evidence of embolization.

The changes in the placenta seen with a dead fetus in utero vary from slight to complete placental autolysis. Inasmuch as these are cases of long-standing fetal death (4 weeks, 40 per cent, or more), apparently these changes are necessary to have thromboplastin available. Under the impetus of Braxton Hicks contractions or labor, this material may be forced into the blood stream and intravascular coagulation occur.

In general the management of a dead fetus in utero is the same as before. It depends upon obstetric conditions. In these patients it would be well, while waiting for spontaneous labor, to look for any sign of extragenital bleeding such as bleeding gums, ecchymosis, hemoptysis, etc. Reid[19] has recommended repeated fibrinogen studies during this period and when labor begins it is essential that adequate fibrinogen levels should be present before delivery is attempted. Shock, if present, is usually from excessive blood loss.

Amniotic Fluid Emboli

The syndrome of amniotic fluid embolus was first described in 1941 by Steiner and Lushbaugh.[25] The chief clinical signs of this syndrome are the sudden development of dyspnea, cyanosis, and profound shock in a patient in vigorous labor. Death was ascribed to the embolic effects of amniotic fluid and an associated anaphylactoid shock. Autopsies on these patients show that the mechanical blockage of the pulmonary vessels by amniotic debris is hardly sufficient to be the cause of death in every instance. The patients who survived the initial shock usually succumbed in a few hours from uncontrollable hemorrhage, formerly attributed to uterine atony from the original shock. Certain predisposing factors have been present in most cases, that is, short tumultuous labor, multiparity, large babies, and ruptured membranes, advanced maternal age, and meconium in the amniotic fluid.

Studies of amniotic fluid have shown it to contain thromboplastin in varying amounts but it does not contain prothrombin, thrombin, heparin, or any fibrinolytic agent. Ruptured membranes and a tumultuous labor could force amniotic fluid between the membranes and the wall of the uterus into the maternal sinusoids at the uteroplacental site or into the lacerated endocervical veins in the lower uterine segment. The fluid crossing the decidua acquires a high concentration of thromboplastin, thus producing an intravascular coagulation reaction, amniotic fluid embolus with an anaphylactoid shock, and probably total defibrination.

Treatment is directed toward preventive, supportive, and definitive therapy. A short tetanic labor should be avoided if possible. Many of the reported cases show the use of Pitocin as an oxytocic to speed up labor. Pitocin is an excellent drug when used judiciously, but dangerous when used without caution. Reid[19] stated that the routine use of an oxytocic with the intent of reducing the latent period following artificial rupture of the membranes for therapeutic or elective induction of labor is equally hazardous and should be condemned. Once this accident occurs heroic efforts should be made to overcome the apnea, cyanosis, and shock with oxygen, blood, etc. If the patient survives the initial shock, the treatment is specific with the replacement of fibrinogen as rapidly as possible and delivery of the baby. It may be possible to save the patients who are being lost due to hemorrhage.

Convulsive eclampsia, excessive muscle activity, and unusually severe uterine contractions have been shown to be associated with fibrinogen depression. Fibrin emboli and hemorrhage from defibrination have never been observed in nonconvulsive toxemia.

The following three cases confronted us within a period of five weeks. They are typical of this condition and all will be confronted by such cases at one time or another.

CASE 1.—A 22-year-old gravida iii, para i, abortus i, was admitted at 8:40 A.M. on Nov. 9, 1954, in the thirty-second week of pregnancy. She had received no prenatal care, was severely toxic, with blood pressure of 160/110, 4 plus albuminuria with granular casts and erythrocytes present, and 2 plus edema. Four hours before admission she developed a backache and uterine bleeding. Uterine tone was marked, no fetal heartbeat was present, and there was no relaxing of uterine contractions noted. The patient had had hypertension during and after a term pregnancy in 1953. Vaginal examination showed a breech presentation with the cervix approximately 40 per cent effaced and one finger dilated. The membranes were ruptured artificially with the intention of speeding up labor. After five hours with no progress beyond 3 cm. dilatation and a fair amount of genital bleeding, and with a diagnosis of abruptio placentae, a cesarean section was performed. A complete separation of the placenta was found and bleeding was heavy from all surfaces, including incision, skin, vagina, mouth, and gums. Hemostasis was difficult.

Blood studies showed the following: Lee-White clotting time 8.15 seconds; bleeding time 2 minutes, 45 seconds; fibrinogen index, control 40 seconds, patient 11 plus minutes; fibrinogen level 0.15 Gm. per cent; clot retraction: the blood clotted after 2 hours, but the clot was soft and spongy; retraction of the clot occurred after 12 hours, but it lysed in 2 days. Fibrinogen, 4.25 Gm., was given and bleeding ceased.

Postoperatively there was oliguria. The blood pressure remained elevated and further laboratory studies showed the following: creatine, 9.2 mg. per cent; nonprotein nitrogen, 106 mg. per cent; uric acid, 7.6 mg. per cent; serum albumin, 2.7 Gm. per cent; serum globulin, 2.0 Gm. per cent; hemoglobin 1.5 Gm. per 100 c.c. on November 9; hemoglobin on November 11, 6,2 Gm. per 100 c.c.; hemoglobin on November 12, 8.5 Gm. per 100 c.c. The postoperative course was characterized by more or less continuous nausea and vomiting and during the last few days she was apprehensive and restless. She received a total of 4,500 c.c. of whole blood during her hospital stay and on November 13, after receiving 750 c.c.

of group-specific (Group A, Rh-negative) whole blood, she complained of tightness in the epigastrium and shortness of breath and was cyanotic. A portable chest plate showed multiple densities and these were interpreted as representing multiple emboli. Following this she rapidly became worse and delirious. Shortly thereafter frothy blood-tinged fluid was coughed up. She became more cyanotic and died at 7:36 P.M. on Nov. 14, 1954.

Autopsy findings of the kidney showed extensive epithelial damage in the tubules with loss of nuclear substance and cell rupture with extrusion of cellular debris into the lumina of the glands. Frequently the lumina of the glands contained acidophilic precipitated protein and pigmented casts probably representing hemoglobin or myohemoglobin. The glomeruli were relatively bloodless but were otherwise not remarkable. This was a classic picture of so-called lower nephron nephrosis or hemoglobinuric nephrosis.

The final anatomic diagnosis was: Immediate causes of death: (1) myohemoglobinuric nephrosis following abruptio placentae; (2) postoperative death (fifth day) following cesarean section; (3) uremia (clinical state). Contributory causes of death: (1) hypofibrinogenemia following abruptio placentae; (2) pleural effusion (right, 500 c.c.; left, 800 c.c.); (3) atelectasis and edema of the lungs; (4) hemorrhage into the rectus muscles at the site of the Pfannenstiel incision; (5) a few small areas of extravasated blood in the uterus.

Of interest in this case was the finding of a marked hemorrhage into the area of the incision in the abdominal wall and little or none in the uterus. On the day of death the patient, after receiving 750 c.c. of group-specific whole blood, showed the clinical signs described above, and a portable chest x-ray showed multiple densities. Therefore, at that time a tentative diagnosis was made of multiple emboli with a questionable diagnosis of transfusion reaction or cor pulmonale.

CASE 2.—A 32-year-old gravida iii, para ii, was admitted at 4:30 P.M., Dec. 6, 1954, in the twenty-fourth week of pregnancy. For 6 hours prior to admission she had had severe uterine cramps. No fetal heart sounds were heard. The course of the pregnancy had been smooth. The blood pressure was 120/65; pulse 80; respirations 24. The uterus was the size of a 30 weeks' pregnancy and in tonic contraction. There was no external bleeding. A diagnosis of premature separation of the placenta (at 24 weeks) with fetal death was made, and a closed cervix was noted on vaginal examination. A cesarean section was elected as the delivery procedure of choice. At operation, 750 c.c. of blood was found in the uterine cavity. Forty per cent of the placenta was detached. Hemorrhage was free from all cut and punctured surfaces. A hematoma developed in the left broad ligament. It was finally necessary to ligate the left uterine and ovarian arteries to arrest the bleeding.

Laboratory studies showed hemoglobin 10.8 Gm. per 100 c.c. The fibrinogen index was determined postoperatively because of the bleeding: control, 1 minute, patient, 11 plus minutes. After 2.46 Gm. fibrinogen was given the bleeding stopped and the patient's index returned to normal.

Postoperatively the patient was morbid. The urine on the third postoperative day showed a trace of albumin, 1 to 5 erythrocytes, 0 to 1 granular casts, and 0 to 1 blood casts. The hemoglobin was 9.5 Gm. per 100 c.c. She was discharged in good condition on the eighth postoperative day having received a total of 1,500 c.c. of blood.

As is noted the laboratory findings in this patient were within normal limits. The cervix was closed and a section was performed. Due to free bleeding during the operation a fibrinogen index was determined during the procedure and as reported was very low and fibrinogen was administered postoperatively. After 2.46 Gm. of fibrinogen was given the bleeding stopped and the index returned to normal. The patient did well postoperatively but the postoperative urine showed abnormal elements indicating injury to the kidney in this case.

CASE 3.—A 35-year-old white gravida vii, para v, abortus i, was admitted on Dec. 20, 1954, in the thirty-seventh week of pregnancy. Her course was normal up to two days prior to admission, when her blood pressure was found to be 166/80. At 6:00 A.M. of December 20 she had a backache and lost about 250 c.c. of blood per vaginam.

On admission the blood pressure was 140/75; temperature 98° F.; pulse 90; respirations 18; the skin pale and wet. The height of the fundus was 33 cm.; the uterus was tense. No fetal heartbeat was audible. Vaginal examination showed the cervix to be 2 cm. dilated, 2 cm. long, and firm. The fetus presented by the vertex which was floating. About 250 c.c. of blood came from the vagina at this time.

Laboratory studies were: hemoglobin 9.6 Gm. per 100 c.c.; leukocytes 22,000; the urine showed 4 plus albumin, granular casts and innumerable erythrocytes. The blood showed no clot in 15 minutes. Fibrinogen was then given and after 1.3 Gm., fibrinogen activity was subnormal at 120 seconds and remained the same after another 2.6 Gm. Fibrinogen activity became normal (15 seconds) after an additional 1.3 Gm. had been given. A transfusion of 1,000 c.c. of blood was also administered.

Cesarean section was elected as the method of delivery. A complete separation of the placenta was found and stillborn twins were delivered. Hemostasis was no problem.

On the seventh postoperative day the hemoglobin was 8.9 Gm. A transfusion reaction followed the receipt of 500 c.c. of blood. On the same day the fibrinogen index was normal. The patient was discharged on the ninth postoperative day.

This patient, like the first patient, was admitted with a premature separation of the placenta in the thirty-seventh week of pregnancy. She also had pre-eclamptic toxemia and a twin pregnancy with dead fetuses. By this time experience had been gained and afibrinogenemia was recognized preoperatively and corrected. A classical section was done through a left rectus incision and hemostasis was no problem.

Summary

These and subsequent cases have proved to us that several definite facts are known and that certain standard procedures are warranted in all hospitals for the proper diagnosis and handling of such a condition.

As defibrination occurs and increases, the platelets then are reduced by lytic action. Defibrination may occur without lysis. Prolonged labor, infection, and other states will produce lysis. Afibrinogenemia and lower nephron nephrosis, while two separate and distinct entities, appear to have at times a common pathogenesis. Page[21] states that the renal-cortical syndrome is the cause of one-third of all the deaths. Decreased fibrinogen and lytic activity together are serious conditions. It is not actually a bilateral cortical syndrome but rather it is an acute tubular necrosis and caused mainly by shock.

In 2 of our 3 cases there was pre-eclampsia along with the abruptio placentae and afibrinogenemia. The autopsy findings in the kidney of the patient who died showed extensive epithelial damage in the tubules, which is in agreement with Page's findings. The autopsy on our first patient showed little or no hemorrhage into the uterus. This substantiates the conclusion of observers in this field that hysterectomy in such cases is not indicated. Removal of the uterus simply shifts the site of bleeding to other areas. Two of these patients had transfusion reactions. One of them, who did not have toxemia, showed blood and casts in the postoperative urine. These patients have had a derangement of the clotting mechanism of the blood; it has been corrected and the blood volume replaced. Apparently they are more vulnerable to anaphylactoid reactions than usual. It is therefore suggested that if the patient is doing well with a hemoglobin of 8 Gm. she should be given iron and the hemoglobin built up slowly.

A fibrinogen index should be obtained routinely in all cases of premature separation of the placenta. It should be remembered that afibrinogenemia may also occur as a result of amniotic fluid infusion and in instances of long-standing

fetal death. The easiest, best, and most used test is the clot retraction time determination. This should be followed by a quantitative test. Ten grams of fibrinogen should be maintained in the hospital at all times. Afibrinogenemia should be corrected preoperatively and blood volume replaced with fresh blood. Usually 1 Gm. of fibrinogen is needed for every pint of blood (averaging approximately 5 to 6 Gm. in treatment). If the case is a missed abortion and the fetus is still present, giving fibrinogen is a waste of the fibrinogen. Some authors have recently been using Apresoline because it relieves spasm of the afferent arterioles and *does not affect hypotension already present.* They even advocate giving it as routine medication in all acute cases. Blutene is reported as having good antilytic action. It stops lysis. But remember it is of no value in preventing defibrination.

Patients with premature separation of the placenta should be promptly delivered by the route indicated by the usual obstetric criteria. The use of Pitocin to stimulate labor in such instances may well be questioned if prompt and easy delivery is not anticipated. Its use may precipitate or increase the severity of afibrinogenemia or lower nephron nephrosis.

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Discussion

DR. JULE C. NEAL, JR., Macon, Ga.—It is very interesting to note that all of Dr. Murphy's patients had transfusion reactions, and that they occurred in transfusions given several days postoperatively. During the past five years The Macon Hospital has had 16,270 deliveries. There have been 272 cases of abruptio placentae and 158 cases of postpartum hemorrhage with 6 cases of afibrinogenemia. There have been no transfusion reactions in any of the cases of afibrinogenemia. There was one death due to irreversible shock from a postpartum hemorrhage before fibrinogen was available. From 8 to 20 pints of fresh blood

were used initially in these cases in an effort to maintain the blood volume and hematocrit. There were no cases of heart failure or pulmonary congestion. We feel that early, adequate blood replacement is attended with fewer transfusion reactions.

Our service now makes it a policy in all cases of third-trimester bleeding to draw 5 c.c. of blood and to attach it to the foot of the bed so it can be observed for clot formation. We have found that this simple procedure helps us to anticipate fibrinogen deficiency. Quantitative fibrinogen levels are run when indicated using the turbidimetric method of Parfentjev. We feel that early diagnosis and prompt therapy are the keys to success in handling of cases of afibrinogenemia.

We realize that Pitocin is a drug to be used with caution, but we feel it has a definite place in the treatment of afibrinogenemia. Rapid evacuation of the uterus is imperative and in select cases "Pitocin drip" may prevent an operative procedure.

I am of the school that still believes in packing the uterus in postpartum hemorrhage. I realize that this is a controversial subject, but it has been most helpful to me. Since the advent of afibrinogenemia, packing of the uterus along with the oxytocics has proved helpful in controlling bleeding until fibrinogen replacement can be instituted.

We also have noted that pre-eclampsia is often associated with abruptio placentae and afibrinogenemia. I realize that Apresoline is a valuable aid in controlling hypertension but I hesitate to use it intravenously because I had a fatal cerebrovascular accident occur immediately following the administration of Apresoline. Similar cases have been reported in the literature and I realize that I may be overcautious as to using intravenous Apresoline, but I feel like the man once bitten by the dog, I hesitate to enter the same dog yard again.

Anticipation, prevention, and active treatment are, of course, primary in obtaining a good outcome in cases of afibrinogenemia regardless of the etiology and predisposing factors. Good blood banks, fibrinogen, and plenty of trained help are all essential in successful treatment of this condition. The more this subject is studied, with the more men studying it, the more conscious we will be of it and the better we will succeed in preventing and treating it.

DR. W. C. WINN, Richmond, Va.—It is important to note that one of Dr. Murphy's patients was only 24 weeks pregnant. In the January, 1956, issue of the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY, Veprovsky and Levin of Forest Hills, New York, reported fibrinogenemia in a pregnancy of only 22 weeks.

It is worth while to emphasize another important point that Dr. Murphy has made. In considering the problem of premature separation of the placenta, it has been noted that afibrinogenemia occurs only in the severe forms of premature separation, which represents only a small percentage of the total number of cases of abruptio placentae. As Dr. Murphy has advocated, it is generally agreed that the status of the clotting mechanism must be positively known prior to operation in these cases. If a firm, stable clot fails to form, any operative procedure should be postponed until the clotting mechanism is restored to normal. This has been emphasized by Reid and others.

In managing intrapartum and postpartum hemorrhage, it is important to have laboratory facilities available and to use such facilities to exclude coagulation defects as an etiological factor. Fibrinogen certainly should be made available for immediate use in such emergencies.

On the other hand, it is dangerous to assume that such bleeding is due to a coagulation defect unless it is proved and other causes, such as trauma and uterine atony, are ruled out. Such an error could be fatal, and a word of caution may be worth while. During the past year, I had to resort to hysterectomy for uncontrollable postpartum hemorrhage, due to uterine atony, in a patient in whom there was no defect in the clotting mechanism. Such an experience is rare in our practice but should be kept in mind. Treating a patient for a defect in the clotting mechanism will not solve the problem, if an extensive laceration is present in the birth canal, until the laceration is also repaired.

DR. HARRY WADDINGTON, Chicago, Ill.—I have just reviewed 254 instances of abruptio placentae in which there was only one patient with defibrination of the blood. Further search showed this to be the only patient with a coagulation defect in the experience

of Research and Educational Hospitals. I feel that prompt evacuation of the uterus by the most feasible route in severe separation will prevent the development of defibrination of the blood.

DR. ARTHUR L. RIVERS, Charleston, S. C.—I wish to ask Dr. Murphy if the brain was examined at autopsy. The symptoms sound very similar to necrosis of the pituitary (Sheehan's syndrome). If this was present, the cause of death is more easily explained.

DR. MURPHY (Closing).—In answer to Dr. Neal, from our experiences we agree that early, adequate blood replacement is necessary and attended with fewer transfusion reactions. One point we wish to stress again, though, is that these patients have had a definite derangement of the clotting mechanism and are more vulnerable to anaphylactoid reactions. Therefore, if a patient is well controlled, do not worry too much concerning an 8 Gm. hemoglobin, particularly three to eight days postoperatively. Iron therapy will suffice.

Pitocin is an excellent drug when used judiciously, but dangerous when used without caution. Routine use to reduce the latent period of labor is hazardous and should be condemned.

Packing has its place in our armamentarium but we find its use limited. If we are dealing with afibrinogenemia, the treatment is specific—fibrinogen should be given. A thorough inspection should determine that blood loss is from the uterine cavity rather than from cervical or vaginal lacerations prior to the use of intrauterine packing.

In answer to Dr. Rivers, clot retraction time and Parfentjev are the laboratory methods which we use. The brain was not examined at autopsy in our patient.

In reply to Dr. Winn's remarks, it is inviting disaster to attempt to deliver patients with afibrinogenemia before a complete evaluation of the blood picture and the amount of separation plus the blood loss. Fresh whole blood and fibrinogen should be given at once and if conservative management is to be followed then serial fibrinogen studies will be necessary to reveal the trend.

TUBAL LIGATION—ITS USE AND ABUSE*

WILLARD C. HEARIN, JR., M.D., GREENVILLE, S. C.

TUBAL ligation is a procedure designed to prevent future procreation in the female. Ideally it should do only that and not interfere with the other physical, emotional, and hormonal body functions. The term sterilization when used in this paper refers to this type of procedure rather than to castration.

This operation is one which has many uses for the benefit of the individual or for society. It is also one which is only too frequently abused. The abuse may be either in the form of too liberal an application or the failure to use it in appropriate cases.

Historical Background

Since 1850 numerous methods have been attempted to assure the permanent sterilization of the female and yet maintain the normal sexual, endocrine, and menstrual integrity of the individual. These have included complete bilateral salpingectomy, ligation with partial resection, simple ligation, burial of the stump in the broad ligament or in the uterus, cornual resections, injections of sclerosing agents into the tubes, transuterine cauterization of the cornu, and possibly others.

The multiplicity of procedures to procure one end result is prima facie evidence of the inadequacy of all. To date, no absolutely sure and safe method has been devised as long as one ovary and a uterus or, should we say, portion of ovary and portion of uterus remain.

Tubal ligation may be done at the time of delivery, accompanying cesarean section or hysterotomy, during the puerperium, or at a time unrelated to pregnancy. The rate of failure reported in most statistical series is twice as great or more for tubal ligations carried out at the time of cesarean section or hysterotomy than for those done post partum. Unfortunately quite a few of the failures result in ectopic pregnancies.

There is a certain morbidity and mortality associated with tubal ligation as there is with any operative procedure. It is impossible to determine how many of the deaths from pulmonary embolism, which incidentally account for the majority of the reported deaths, were primarily a result of the tubal ligation and how many were primarily due to the preceding delivery and the reason for the tubal ligation such as multiparity with its accompanying varicosities and/or chronic thrombophlebitis.

Indications

The indications for tubal ligation may be divided into two large groups, voluntary and involuntary. We are here concerned only with the former group.

There is certainly no unanimity of opinion among the medical profession which will allow a set of hard-and-fast rules to be followed by all with satis-

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faction. If there were we would have no problem. We do not intend to broach the subject of religious objections which must be left entirely to the dictates of the individual physician and patient. We will briefly discuss some of the more commonly cited medical indications.

Chronic Hypertensive Cardiovascular-renal Disease.—It is well known and generally accepted that these patients tolerate pregnancy extremely poorly. There is considerable danger to life, and the chance of obtaining a viable infant is extremely poor. These individuals should be sterilized at the time of therapeutic abortion if that is necessary. Any therapeutic abortion done for a *permanent* medical indication is an incomplete procedure unless it is accompanied (or followed as soon as is safe) by permanent sterilization. The eye grounds and the renal function are the two most reliable methods of determining the extent and permanency of the condition. Essential hypertension alone is not sufficient ground for sterilization. We might also include in this group cases of repeated severe toxemia, tuberculosis of the kidneys with ureteral transplants, and polycystic kidneys with diminished renal function.

Heart Disease.—The incidence of heart disease severe enough to warrant tubal ligation fortunately is rare in patients of this age group. Rheumatic endocarditis per se, which accounts for most of the heart lesions found in women of the childbearing age, is not sufficient cause for tubal ligation since most of these women with careful management can successfully tolerate pregnancy. The cardiac reserve is the chief consideration and previous congestive failure is the significant factor. It is hoped that with the improved surgical techniques in cardiac surgery many of these and the occasional patient with congenital heart lesions may be so improved that the number requiring sterilization will materially decrease.

It is true that some institutions have reported excellent results in successfully carrying patients with severe cardiac debility through pregnancy. Unfortunately, all communities do not have such excellent facilities and, as is true with so many other conditions in medicine, only the very rich or the very poor can "afford" the ideal treatment.

Repeated Cesarean Section.—This constitutes a large percentage of the indications in any series of tubal ligations. Still there is not complete agreement as to where the line should be drawn. The general consensus seems to be to perform a tubal ligation following the second section on urgent request of the family. It is recommended after the third and urged after the fourth. There are some who point to the fact that it is possible to have an unlimited number of sections but the fact remains that the cervix, vagina, and perineum were created as a birth canal, the peritoneal cavity and abdominal wall were not.

Malignancies.—There may be an occasional case of malignancy in which sterilization may be advisable. Granted, very few will have tubal ligation as a primary procedure but it may be carried out as an associated surgical procedure.

Varicosities and Recurrent Thrombophlebitis.—Severe varicosities of the vulva and lower extremities may on occasion warrant prevention of further pregnancies. The former are not amenable to satisfactory treatment and the latter are not always rendered safe even with surgery. The danger of pulmonary embolism in these patients is real.

Psychiatric Conditions.—In states which do not have proper eugenic laws and even in those with adequate legislation many patients in this category become the responsibility of the private practitioner. Here there is room for considerable abuse of the operation. Such indications as "unstable nervous system," "nervous condition," "emotionally unstable" are not to be con-

sidered adequate diagnoses. Tubal ligation for psychiatric reasons should only be done in cases in which pregnancy would lead to suicide, disruption of the family, or other serious consequences. This should be confirmed by psychiatric consultation as well as other competent medical consultation.

Hereditary Disease.—Here each case must be strictly individualized and a careful genetic history obtained in order to give the patient a clear understanding of the probable incidence of abnormality among her children. Some families may be willing to accept greater odds than others. Some of the conditions considered in this group but not given a blanket approval for sterilization are cases of Huntington's chorea, epilepsy, congenital malformations, fibrocystic disease, mental retardation, and manic depressive psychosis.

Multiparity.—This probably constitutes the largest single reason for the performance of tubal ligation the country over. It is impossible to determine the exact percentage because many of the listed indications are merely camouflage for the real reason of multiparity. There is some room for difference of opinion on the number of pregnancies which constitute multiparity warranting tubal ligation. A number of the teaching institutions place the dividing line at eight,[1] while some[2] are more liberal and say five living children in a woman over 30. It is somewhat difficult to see the reason for a restriction of age of the patient or the requirement of "living children" unless we are including the socioeconomic factor which many do not recognize as a valid reason. The results of having 5 or 8 children can be just as deleterious to a woman of 25 as to one of 35, possibly more so since they would be more closely spaced. Provided the pregnancy has proceeded to a period of viability or to term, it will have the same result on the mother's health regardless of the ultimate outcome of the child.

Major Vaginal Plastic Surgery.—Most gynecologists feel that where major vaginal plastic surgery is done to repair the relaxations caused by repeated childbirth or repair of vesicovaginal and rectovaginal fistulas, tubal ligation is indicated, if the patient so desires, to prevent further major surgery.

Diabetes.—Certainly the diabetic patient deserves the chance to have a family but the severe diabetes, particularly of long standing, and diabetes difficult to control should be indications for limitation of pregnancy, depending upon the individual case.

Tuberculosis and Pulmonary Disease.—Generally speaking it should not be necessary to sterilize the patient with tuberculosis but an occasional patient with severe reduction of pulmonary capacity who might be seriously jeopardized by the further burden of pregnancy may constitute a legitimate reason. This is also true of patients who have had pulmonary surgery for other causes resulting in decreased pulmonary capacity.

Rh Incompatibility.—This indication has been seriously abused. The lay press can take credit for much of the apprehension on the part of the general public but unfortunately too many physicians know too little concerning the genetics involved. Despite its misuse we feel there are occasional cases to which consideration is due. When a couple has lost two or more children from erythroblastosis, especially before birth, and the husband is homozygous Rh positive, there is a negligible (less than 10 per cent ?) chance of having a viable infant. These odds seem to warrant tubal ligation.

Socioeconomic Considerations.—We have placed the most controversial indication at the end of the list. Many physicians and institutions do not recognize it as a valid indication for tubal ligation. Despite this attitude it is responsible for many of the operations which are being performed today. It may not always be listed on the patient's chart but it is frequently the prime motivating reason behind the scene. It is a subject which we cannot answer since it boils

down to one's own moral feelings on the subject. Certainly in many instances humanitarian impulses and special pleas from intimately known patients are clouding professional judgment. There is no apparent way at present of solving this difference of opinion to the satisfaction of all. Let it suffice to say at this point that the physician who agrees to perform a tubal ligation for socioeconomic reasons is walking on thin ice from a legal standpoint.

It appears more logical to carry out sterilization for socioeconomic reasons on the "breadwinner" of the family, namely, the male. Undoubtedly the number of requests would be materially reduced if this policy were followed.

Administrative Control

The control of sterilization procedures in hospitals varies widely throughout the nation. There may be wide divergence in the same community from one hospital to another. The ideal method of control appears to be one which would protect the group ethics, not curtail or infringe on the individual liberties of the patient and her husband or the individual physician until it has been shown the ethical outlook of the individuals is at wide variance with the group ethics, and grant adequate legal protection to the operating physician.

Among the methods used are the following:

1. No restriction other than the individual ethics of the attending physician. This would certainly not infringe on anyone's liberty but would most certainly lead to abuse by some and would grant no legal protection.

2. Consultation with one or more staff members. This would give some legal protection but generally exercises little control since it is too easy to have a mutually satisfactory arrangement.

3. Complete administrative control by the hospital.

4. A board selected or appointed from the hospital staff to grant or deny permission for all sterilization requests. This affords excellent control and legal protection but is objected to as being too dictatorial on a subject which has such a wide variation of medical opinion.

5. A hospital staff board to act only on the request of the attending physician. This would serve only to relieve the attending physician of pressure from the family in certain cases and would lack any actual control.

6. A hospital staff board to act only on the request of the attending physician but review the record of all sterilization procedures and possesss punitive powers in the case of repeated or flagrant abuse. This last method seems to come closer to achieving the ideal but we feel it should be combined with formal signed consultation by at least two staff members for all cases not voluntarily submitted to the board in order to give proper legal protection.

Adams[3] has suggested certain broad criteria for socioeconomic sterilization which may serve as a guide for any board considering sterilization requests: "(1) The procedure must be legal in the locality in which it is carried out. (2) The request for sterilization must come from both the husband and wife, in signed statement. (3) The procedure must not conflict with the religious views of the denomination to which they belong. (4) Both must understand the permanency and possible failure of the procedure. (5) At least one of the couple must be known to the operating physician. (6) A trial of contraceptive measures must have failed. (7) The need for socioeconomic sterilization must be real. (8) The hospital form, signed by both the husband and wife, must be on file in the hospital at least 30 days before the estimated date of confinement."

Legal Aspects

The legal aspects of sterilization can be discussed only in broad terms since the laws of the individual states are so different. Each physician who performs sterilization operations should familarize himself with the laws of his own state.

Thirty-one states and the Commonwealth of Puerto Rico now have some statute relating to sterilization. Some states have laws definitely prohibiting sterilization. The first eugenic sterilization law was passed in Indiana in 1907. These laws vary widely in their scope, great contrast being exhibited in the sister states of North and South Carolina. North Carolina is considered to have one of the best eugenic laws in the nation, while recently a South Carolina Domestic and Juvenile Court judge urged passage of an effective state sterilization law to protect the public. The present law provides only for the sterilization of prison inmates where penal authorities deem it best for the protection of the inmates. The North Carolina law states "... that sterilization of mentally diseased, feebleminded, or epileptic persons may be carried out if it is 'for the best interest of the mental, moral, or physical improvement of the patient, or for the public good,' or is needed to prevent the procreation 'of a child or children who would have a tendency to serious physical, mental, or nervous disease or deficiency.' The individual's own rights are clearly protected by due legal processes and there is a specific section of law which relieves the surgeon of any responsibility for performing the operation."[2]

The legal basis for voluntary medical sterilization is not so specific in any state. It is the general consensus of legal opinion that, in states which do not have specific laws to the contrary, therapeutic sterilization for *medical* reasons is legally defensible, especially when adequate consultation has been obtained. There is considerable doubt whether the consent of the husband and wife for sterilization for nontherapeutic reasons is valid since it may be contrary to public policy and therefore void. The consequences to a physician for the performance of an operation of this kind should the courts hold it illegal could be serious.[4]

Litigation may be instituted either as a criminal or civil action. The criminal action may be taken under the statutes pertaining to mayhem or assault and battery. In this connection it would be prudent for each physician to check his malpractice insurance policy since some policies grant protection only if action is brought as a malpractice action but do not afford protection against charges of mayhem or assault and battery.

It can only be hoped that more states will follow the example of progressive legislation set by a few. Even in the states which have good eugenic laws there is need for more specific legislation regarding other cases of sterilization. This is particularly necessary in this day of increasing malpractice suits. At the present time the physician stands in a precarious legal position. It is the duty of the medical profession to lead the way in urging the passage of more realistic and appropriate legislation in the individual states.

Summary

1. A brief review of the methods used for tubal sterilization is given.

2. Indications for tubal ligation are presented and discussed as regards their merits.

3. Methods for the administrative control of sterilization procedures are presented. The plan for a hospital staff board to pass on cases on request and review all cases with power to stop abuses is favored.

4. The legal status of tubal ligation is discussed and the need for more specific and appropriate legislation pointed out. The medical profession is urged to lead the way in securing this needed legislation.

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Discussion

DR. J. W. DOUGLAS, Pensacola, Fla.—The proper control of tubal sterilizations presents a particular problem in the open-staffed hospitals where the authority to perform a sterilization is held with possession of major surgical privileges and with, although sometimes without, an appropriate consultation. As Dr. Hearin has pointed out, there are disadvantages to any method used to control sterilizations. The idea of an appropriate committee either to approve or to review all sterilizations performed seems to be the most effective way. For many reasons, such a committee would function more efficiently if it served in a reviewing capacity. With this plan, each proposed tubal sterilization would need consultation with one or two qualified staff members, prior to operation, and the case would be reviewed later by the special committee at its periodic meeting.

It does not seem out of order, at this point, to mention hysterectomy as a sterilizing procedure. We stress the importance of "controlling" tubal sterilizations in our hospitals; is it not just as important also to control hysterectomies? Could not the special committee discussed above also serve as a gynecological auditing committee and review all gynecological surgical procedures which are performed? In my opinion, this committee would do a great deal more to elevate surgical standards than is being accomplished at present by the tissue committees, of which we have heard so much in the last few years.

In regard to indications for sterilization, I would like to propose that in certain cases the term "medical necessity" to justify sterilization be considered in its broadest aspects. Most of us here have patients whom we have known for years whose emotional strains and domestic tensions are seriously aggravated by the constant fear of another pregnancy. Our most fervent efforts to change this state of mind will be unsuccessful. Are not such women worthy to be considered as candidates for sterilization? The words of Dr. Foster Kennedy concerning sterilization and eugenics can be applied here: "In this sphere of thought it is easy to be dogmatic, difficult to be right."

In the last analysis, control of sterilizations depends in great part upon the training, the conscience, and the integrity of the individual surgeon.

Dr. Hearin's discussion of the legal aspects of sterilization is valuable information. It would be a worthy project if various obstetrical and gynecological societies throughout the country would make official recommendations to the state legislatures concerning the enactment of laws which would clarify the legal problems of sterilization.

DR. HERBERT M. BLACK, Columbia, S. C.—Dr. Hearin has presented a subject that is very important to all of us medically as well as legally. I believe that most of us will agree with his indications for tubal ligation listed under "medical." However, following vaginal plastic procedures, excluding vesicovaginal fistulas, a vaginal delivery may be accomplished without much damage, provided an adequate episiotomy is performed and repaired. These plastic procedures alone will not justify sterilization.

The author also reported a failure rate twice as great when sterilization is done at cesarean section. In our experience, this failure so far has been reduced to zero by ligating the proximal end of each tube with silk and the distal ends with chromic catgut, plus excision of these distal loops.

When multiparity and economic reasons are advocated for tubal ligation before any medical group, "battle lines are drawn" and "fur begins to fly." How many of you have had patients come in and ask, as one did, "Doctor, can you unsterilize me? I was sterilized three months ago, am 23 years old, and have only two children." Why didn't she go back to her original surgeon? This was answered by, "I was ashamed to go back to him. I talked him into sterilizing me." Then again, the story may take the form as reported by Mr. G. E. Hall in his article, "The Physician and the Law." "Say, Doc, I would like to

ask you something. We already got seven kids. You know—you delivered them, I guess I still owe you for the last two. I don't have much of a job. We can't afford any more—not even the ones we have got. I heard there is some kind of an operation that you can perform on me or my wife to keep us from having any more." In the first case, the patient should have had some protection from the unscrupulous surgeon, as she did not know the tragedy of such a procedure. In the latter illustration, maybe the medical doctor needs some protection, that is, protection in the form of some definite rules to state to the patient.

Now does "great multiparity" justify sterilization? Dr. TeLinde in his text on *Operative Gynecology* stated that Dr. Eastman advocated such a procedure. At the present time, however, Dr. Eastman says that "sterilization because of great multiparity alone cannot be justified on medical grounds." Also, it may be stated that anyone who ligates tubes for economic reasons instead of therapeutic necessity is treading on very dangerous grounds. He has no law to protect him in case of a suit.

I believe that Dr. Hearin is right when he states that it is the duty of the medical profession to lead the way in urging the passage of appropriate legislation in each state. The South Atlantic Association of Obstetricians and Gynecologists could certainly aid in this step if it would formulate some concrete suggestions on this very important subject.

DR. ROBERT H. BARTER, Washington, D. C.—Dr. Hearin has presented a subject that is very important to all of us medically as well as legally. I believe most of us will agree, at least for the most part, with the medical indications for sterilization as listed. However, I would like to interject a different approach. In selected individuals we have been doing a vaginal hysterectomy instead of a tubal ligation. There are many reasons for our changed thinking.

One is that we feel that the patient who has had a tubal ligation, for some reason or other, seems to have more problems with abnormal bleeding than do women in general. We have also seen several patients with carcinoma of the cervix or of the endometrium who have had a previous tubal ligation.

Vaginal hysterectomy with repair can correct the relaxation that most multiparous patients have. It completely eliminates pregnancy instead of leaving the patient with a 2 per cent chance of becoming pregnant. It will rid her of a possible discharge from cervicitis which is common in many grand multiparas. Finally, there seem to be far fewer immediate and delayed postoperative psychogenic complications in these patients who have had vaginal hysterectomies rather than tubal ligations.

One thing I must disagree with. I do not think that pelvic plastic surgery need be accompanied by tubal ligation. I agree with Herbert Black that if an anterior and posterior repair has been done and the patient has become pregnant, vaginal delivery is acceptable. Our very strong conviction, however, is that it is much better to wait until the patient is through having her family and then to do a definitive pelvic plastic operation which will include a vaginal hysterectomy. That eliminates the future obstetrical problems which may follow inadequate pelvic plastic surgery which has been accompanied by a tubal ligation.

Again, it must be emphasized that vaginal hysterectomy is employed in only a very select group of patients.

DR. HEARIN (Closing).—We do not try to cover in this paper all the forms of sterilization but have restricted it to tubal ligation.

I think one of the biggest problems that we all have to face, which is not covered in this paper, is the procedure of normal tubes being removed very frequently by bilateral salpingectomy for supposed pelvic inflammatory disease, with a pathological report of normal Fallopian tubes. I think these cases should also come under the critical evaluation of any reviewing committee, whether it be the tissue committee or the committee set up to study sterilization.

THE ROLE OF RETAINED PLACENTAL FRAGMENTS IN IMMEDIATE AND DELAYED POSTPARTUM HEMORRHAGE*

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THOUGH the healthy obstetric patient is usually considered beyond threat to life and health after the first days of the puerperium, she and her physician are occasionally surprised some days or weeks later by the occurrence of uterine hemorrhage of sufficient quantity to constitute an acute emergency requiring hospitalization and active therapy. The frequent finding of retained placental tissue in such cases has been stressed in a few reports.[1, 2] The work of Wolfe and Pedowitz is particularly informative; in their series placental fragments caused delayed bleeding in 32 patients, an incidence of once in 1,005 deliveries, and accounted for two-thirds of their cases of late puerperal hemorrhage. Though many cases seem unavoidable, few obstetric complications can be less satisfactorily explained to the patient and more often cause loss of faith in the physician. Incomplete expulsion of the placenta also accounts for some hemorrhages following soon after delivery.

This statistical study was undertaken to determine the incidence of retained placental fragments, to evaluate the factors underlying their occurrence, to learn the details of their fate during the puerperium, and thus to draw some conclusions regarding their prevention and management.

Material and Definitions

The cases considered here have occurred among 9,732 consecutive private patients, registered between Jan. 1, 1946, and Feb. 28, 1955, who were delivered vaginally after the twenty-eighth week of pregnancy. Abortions and abdominal deliveries have been omitted because of obvious differences in management of the third stage of labor, thus permitting more valid conclusions concerning prevention and early recognition of retained placental tissue. No death from hemorrhage occurred among these patients.

For convenience in discussion, hemorrhage while the patient is still on the delivery table has been classified as immediate, to distinguish it from bleeding later in the first 24 hours after delivery which has been considered as early postpartum hemorrhage. Abnormal bleeding after the first day has been termed delayed or late postpartum hemorrhage.

Blood loss in most instances has been only estimated by the attendant, hence the statistics concerning the amount of hemorrhage are admittedly approximate, but are considered worthy of inclusion to show the relative

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significance of various causes of abnormal bleeding. Hemorrhage was classified as mild when the estimate was between 300 and 500 c.c., moderate when 500 to 1,000 c.c., and severe when over 1 L. Among the patients with late hemorrhage the severe cases have been considered those requiring hospitalization for observation or active treatment.

Incidence

As shown in Table I there were 85 cases of retained placental fragments in the period studied. In 45 instances they were not associated with abnormal bleeding. The time in the puerperium during which the retained fragments were diagnosed is seen in Table II; the time of occurrence of abnormal bleeding in 40 cases is also recorded here. In several cases hemorrhage occurred in more than one of the arbitrary divisions of the puerperium, accounting for the apparent discrepancy in this column. It will be noted that the majority of fragments were diagnosed in the delivery room and most of them did not cause immediate hemorrhage, whereas unrecognized fragments remaining in the uterus into the late puerperium resulted in abnormal bleeding in nearly every case. Further details concerning the retained fragments and the hemorrhage they originated will be discussed under the separate headings of immediate, early and late hemorrhage.

TABLE I. INCIDENCE OF HEMORRHAGE FROM RETAINED PLACENTAL FRAGMENTS

Vaginal deliveries in last trimester	9,732
Cases with retained placental fragments	85 or 1:114
Retained fragments associated with hemorrhage	40 or 1:243

TABLE II. TIME FRAGMENTS WERE RECOGNIZED; TIME HEMORRHAGE OCCURRED

TIME	FRAGMENTS DIAGNOSED	FRAGMENTS ASSOCIATED WITH HEMORRHAGE
Immediate puerperium (in delivery room)	61	25
Early puerperium (to 24 hours)	5	4
Late puerperium (after 24 hours)	19	18

Management of the Third Stage

Since the third stage of labor is the time of origin of the pathology under discussion it is well to recount briefly the management of the normal and abnormal third stage as we employ it. Virtually all patients are under light ether anesthesia for delivery; Pitocin is given subcutaneously after the anterior shoulder comes beneath the symphysis, and the delivery is conducted slowly. Unless abnormal bleeding occurs, the first few minutes after delivery are used in caring for and examining the infant. By this time separation has usually occurred and the placenta lies in the lower uterine segment or vagina. It is then expressed by fundal pressure aided by slight traction on the cord. If the placenta has not descended to the lower canal, examination may disclose a persistent contraction ring just above the lower segment leaving a passage only 3 or 4 cm. in diameter. This will most often relax within a few minutes; if not, deeper ether anesthesia and the use of Adrenalin 1:1,000, in dosage of 4 to 8 minims, will usually cause it to disappear. A persistent ring is most often an indication that separation of the placenta is not yet complete, and is seldom the actual cause of retention. Failure of separation with-

in 15 to 20 minutes or significant bleeding due to partial separation regardless of the duration of the third stage is considered an indication for manual separation and removal of the placenta.

Abnormal bleeding after the third stage is usually managed by the use of Pitocin given intravenously or intramuscularly, or in dilute solution as an intravenous infusion. Uterine tamponade after exploration of the uterus is employed for persistent bleeding due to atony and in many cases of low implantation of the placenta even without unusual bleeding. We have found insertion of a uterine pack with a Holmes packer a very valuable method of controlling hemorrhage, and consider it a measure of prevention and not one of last resort. Exploration of the uterus is carried out when examination of the placenta reveals evidence of missing tissue, when bleeding persists despite oxytocics, and when the nature of the labor or delivery makes trauma to the upper birth canal a possibility. Invasion of the uterus, including uterine tamponade, is not considered an indication for prophylactic use of antibacterial agents.

Among the cases studied, uterine exploration has been carried out 401 times and no serious complications have resulted. This is in agreement with the observation that invasion of the puerperal uterus under antiseptic conditions is a benign procedure.[3, 4]

Immediate Hemorrhage

The relative significance of retained placental fragments as a cause of immediate puerperal hemorrhage is shown in Table III. Abnormal blood loss with the patient still in the delivery room was associated with retained placental tissue in 25 instances, or 4.3 per cent. In 5 cases bleeding was attributed to atony and the diagnosis of retained placental tissue became evident at a later time. The diagnosis in the remaining 20 cases was made when the uterus was explored because of persistent bleeding or evidence of missing tissue on placental examination or both. In 2 cases where relatively large placental elements were removed, repeat examination of the placenta and membranes showed nothing to indicate missing tissue and these were considered to be spurious placentas. Four cases involved succenturiate lobes; 2 of these were suspected because of torn vessels at the placental margin, and 2 because the membranes could not be removed by moderate traction.

TABLE III. HEMORRHAGE IN THE IMMEDIATE PUERPERIUM (DELIVERY ROOM), INCIDENCE 1:17, OR 5.91 PER CENT

	MILD	MODERATE	SEVERE	TOTAL	PER CENT
Retained placental fragments	17	8		25	4.3
Atony, during or after third stage	335	154	9	498	86.6
Trauma	40	11	1	52	9.0
Totals	392	173	10	575	

Retained fragments were suspected on placental examination alone in 108 cases in which abnormal bleeding did not occur. Exploration of the uterus was rewarded by the finding and removal of placental fragments in 41 of these cases. In 4 additional cases placental cotyledons were expelled spontaneously in the first 48 hours of the puerperium without associated excessive bleeding.

It is thus seen that most of the retained placental fragments did not cause immediate hemorrhage. When excessive bleeding did occur it often resulted from the retention and difficult removal of tissue densely adherent to the uterine wall. As indicated in Table IV, abnormally adherent fragments, encountered in 10 cases, caused greater blood loss than tissue which was easily separated. In 7 of these 10 cases the tissue had to be forcibly removed,

piecemeal, without evidence of a cleavage plane, and these were classified clinically as partial placenta accreta. Five of these 7 fragments, including 2 succenturiate lobes, were attached in the lower uterine segment. No factors usually considered as predisposing to placenta accreta were noted in the case histories. In the management of these cases, as much of the adherent placental tissue as possible was removed and uterine tamponade was employed to control bleeding, circumventing a possible need for hysterectomy. Small placental fragments came from the uterus along with removal of the pack in several cases. Hemorrhage did not recur in any case after removal of the pack.

TABLE IV. IMMEDIATE HEMORRHAGE DUE TO RETAINED FRAGMENTS

		COMPLICATIONS AND TREATMENT			
	NUMBER	SHOCK	BLOOD TRANSFUSION	UTERINE PACK	MORBIDITY
Placental fragments:					
Adherent	10	2	4	9	1
Nonadherent	10		1	1	
Unrecognized*	5				

*These uteri should have been explored.

Early Hemorrhage

Hemorrhage in the first 24 hours, after the patient leaves the delivery room, presents some special aspects, since recognition is often dependent on personnel other than the obstetrician, and active treatment is likely to be postponed. The cases of abnormal bleeding which occurred during this portion of the puerperium are summarized in Table V. In 25 cases the hemorrhage was uterine in origin. In none of these did significant bleeding begin more than 12 hours after delivery and in all but 3 it began within 6 hours post partum. In 19 cases the bleeding was controlled with oxytocics and massage of the fundus; in 2 of these, retained placental fragments were diagnosed some days later.

TABLE V. HEMORRHAGE IN THE EARLY PUERPERIUM (FIRST 24 HOURS), INCIDENCE 1:314

CAUSE	MILD	MODERATE	SEVERE	TOTAL	PER CENT
Retained placental fragments	2	1	1	4	12.9
Uterine atony	14	4	3	21	67.7
Paragenital hematomas				6	19.4
Total				31	

In 6 instances, however, the patients were returned to the delivery table, anesthetized, and the uterus explored and packed. Shock occurred in 5 cases, and an equal number required blood transfusion. In 2 instances large placental fragments were found and easily separated from the uterine wall. There had been mild hemorrhage immediately post partum in both cases, attributed to atony. Interestingly, in one case the placenta had been described at delivery as being torn radially, but seemed to fit together and be complete; at exploration a wedge-shaped fragment of considerable size was removed.

Delayed Hemorrhage

Abnormal puerperal bleeding after the first 24 hours was recorded in 66 cases. These are summarized in Table VI. Minor episodes of heavy lochia were of course noted in a considerably larger number and others doubtless never reached the attention of the attendants.

In 39 cases bleeding was mild and was controlled with bed rest and Ergotrate given orally. In 6 of these cases, however, after repeated small hemorrhages or continuous heavy red lochia, small placental fragments, under 3 cm. in diameter, were eventually expelled spontaneously or removed from the cervical canal at subsequent examination. These fragments had a gray fibrinous external surface and a core of placental tissue and old clot. One fragment was adherent to the wall of the cervical canal. In one case the fragment was expelled on the twenty-second day. In the other 5 it was retained longer than 6 weeks (43 to 71 days). In 3 cases a continuous heavy red lochia followed delivery, while in 3 others bleeding did not begin until 2 weeks post partum. Pain was not a symptom. Morbidity was noted in one of the 6 cases; in this case femoral thrombophlebitis occurred during the second week of the puerperium. Pelvic examination in these cases, before expulsion of the fragment, revealed only subinvolution of the uterus and a slightly patulous cervix. In all 6 cases the placenta had been considered normal at delivery and there were no abnormalities of the third or fourth stage except for excessive blood loss in one case, attributed to atony.

TABLE VI. HEMORRHAGE IN THE LATE PUERPERIUM (AFTER 24 HOURS), INCIDENCE 1:147

CAUSE	MILD	SEVERE	TOTAL	PER CENT
Retained placental fragments	6	12	18	27.3
Retroversion with subinvolution	6		6	9.1
Cause undetermined	27	15	42	63.6
Total	39	27	66	

There were 27 cases of late hemorrhage classified as severe (an incidence of 1:361). The management of these cases is summarized in Table VII. Bed rest and oxytocics were employed in all cases in an effort to control the bleeding. These measures were successful in 12 cases. In one of these a placental fragment was expelled spontaneously on the seventh postpartum day. Bleeding continued despite these measures and required operative intervention in 15 cases. Pathologic reports on the curettage specimens included (1) decidua in one case (fourth day post partum), (2) tissue consistent with the placental site in 2 (sixth and twenty-fourth days), and (3) proliferative endometrium in one (forty-ninth day). In none of these was there actual proof of the cause of bleeding. In the remaining 11 cases placental tissue, grossly recognizable or microscopically proved, was obtained.

TABLE VII. MANAGEMENT OF SEVERE LATE PUERPERAL HEMORRHAGE

CAUSE	OXYTOCICS	BLOOD TRANSFUSION	CURETTAGE	UTERINE PACK
Retained placental fragments	12	11	11	10
Other cause	15	3	4	4

Thus there were 12 cases of retained placental tissue, accounting for 44.4 per cent of the late puerperal hemorrhages of major degree, and giving an incidence of 1:811. Abnormal bleeding in the early puerperium had occurred in 4 of the cases, but the placenta had been considered normal and complete at delivery in all of them. In 6 cases there was a period of several days during which the lochia was diminishing and normal in amount; however, in all cases, once heavy bleeding began it continued, with frequent episodes of rather profuse hemorrhage, until the uterus was evacuated. The times of onset of significant bleeding were rather evenly distributed from the fourth to the

fifteenth day post partum. Pain was not a prominent symptom and fever was usually absent, though the presence of latent infection was indicated by the occurrence of postoperative morbidity in 4 cases. Examination in every instance showed the uterus to be enlarged, sometimes considerably distended by clots, and the cervix patulous, not requiring dilatation before digital exploration and curettage. The delayed hemorrhage caused shock in 8 instances and blood transfusion was required in 11 of the 12 cases.

In 5 cases operative management was chosen with the first episode of significant bleeding because the hemorrhage was profuse and continued despite the use of oxytocics. In 5 other cases there was a delay of 2 to 13 days between the first gross hemorrhage and operation. In one case curettage was performed on the forty-first day after repeated small hemorrhages caused a severe anemia. In the remaining cases curettage was carried out between 5 and 28 days post partum, and in most instances (7 cases) between the tenth and fifteenth days.

The usual operative procedure consisted of digital exploration of the uterine cavity, removal of the fragments by digital separation or with ovum forceps, followed by light curettage (after administration of Pitocin to contract the myometrium), and insertion of a uterine pack, which was removed after 24 to 48 hours. Prophylactic antibiotics were given in 7 instances. In one case placental fragments were removed digitally from the lower uterine wall but the cavity was not further explored. Continued bleeding with shock 3 days later led to a second exploration when several small fragments were found adherent to the upper part of the uterine wall and were removed by curettage. Hemorrhage did not recur in any case after the uterus was empty. In 3 cases a low-grade fever occurred postoperatively and in one case the temperature rose to 103° F. and pneumonia developed a short time later.

In 7 cases the tissue was densely adherent to the uterine wall and in one of these a histologic diagnosis of partial placenta accreta was reported.

Table VIII shows the relationship of the size of the retained fragment to the time of onset of excessive bleeding and to the time of removal. In 5 cases the placental fragment was relatively large (more than 4 cm. in diameter). Hemorrhage in these 5 cases began no later than the ninth day and was heavy and constant, requiring curettage no later than the twelfth day. Small fragments in 4 instances produced a similar picture, but in 3 cases the bleeding was intermittent and less in amount, finally requiring curettage between the twenty-fifth and forty-first days.

TABLE VIII. RELATIONSHIP OF SIZE OF FRAGMENT TO TIME OF HEMORRHAGE AND REMOVAL

SIZE OF FRAGMENTS	NUMBER	ONSET OF HEMORRHAGE		TIME OF REMOVAL	
		FIRST 2 WEEKS	LATER	FIRST 2 WEEKS	LATER
Large (over 4 cm. diameter)	5	5	0	5	0
Small	7	5	2	3	4

Retained Membranes

During the course of this study it was convenient to review the cases in which a major portion of the membranes was retained in the uterus. Table IX gives the findings in these cases. Retained membranes were recorded in 74 cases. Circumvallate or marginate placenta, in which the membranes tear easily at the fibrin ring, was present in 26 of these. In 35 instances the uterus was explored and the membranes removed with gauze-covered fingers. In 39 cases (1:237), most of the membranes remained in utero. In 3 of these fever

occurred in the early puerperium. In 7 cases there was excessive or prolonged discharge of lochia rubra; moderate hemorrhage occurred in one case on the eighth postpartum day, and mild hemorrhage in another on the seventeenth day. There were no retained placental fragments in these cases.

TABLE IX. OCCURRENCE AND SEQUELAE OF RETAINED MEMBRANES (74 CASES)

	NUMBER	MORBIDITY	PROLONGED BLEEDING	DELAYED HEMORRHAGE
Exploration, removal of membranes	35	1	1	
Exploration, partial removal	10	1	3	
Not explored	29	2	4	2

Comment

Two factors seem involved in the origin of retained placental tissue. First, there may be pathologic conditions in the placenta itself. The presence of a spurious lobe without connection to the fetal circulation seemed almost certain in 2 of the cases with immediate hemorrhage, and was likely in several cases diagnosed later in the puerperium. No evidence was found that any of these was associated with a retained twin blighted ovum pregnancy as reported by Leff.[5] Partial placenta accreta was clinically diagnosed in 7 cases with hemorrhage just after delivery. Implantation in the lower uterine segment seemed an important factor in predisposing to abnormal attachment of the placenta. The coincidence of placenta accreta and low implantation has been frequently remarked.[6, 7, 8] In 8 cases diagnosed in the late puerperium partial placenta accreta was suspected clinically and the diagnosis was proved microscopically in one of these. Since hysterectomy was not required histologic proof was usually lacking.

Second, there may be abnormalities of the third stage of labor. If the placenta is slow to separate and descend it is a natural reaction to employ more fundal pressure than would be considered ideal since this may obviate more time-consuming and complicated procedures. From such minor defections in third-stage management, seldom noted in the record of labor, probably arise most retained fragments of normal placentas. This factor has been stressed by Lorenz.[2]

Extreme caution and gentleness in the management of the third stage would therefore seem advisable in order to reduce the incidence of hemorrhage from placental fragments. More important, however, is careful manual exploration of the uterus if there is any abnormality of the third or fourth stage of labor; for example, if bleeding is at any time excessive; if there is any difficulty in delivery of the placenta; if there is evidence of missing tissue on examination of the placenta (a tear in the placental tissue or fetal vessels, or bleeding from the placental substance); if the placenta seems deficient in size; or if the uterus fails to contract well or seems larger than expected after the third stage. Retention of the membranes necessarily means retention of more decidual tissue than normally occurs. Though major complications are unlikely to follow, increased bleeding and morbidity are frequent enough to warrant exploration of the uterus and an attempt at removal with the fingers,

covered with gauze. Hawkins[4] has suggested routine exploration of the uterus as a means of avoiding subsequent complications due to retained secundines. Such a procedure, especially as a "teaching routine" in the training of obstetricians, might lead to careless and inadequate exploration and thus lose some of its value. Use of exploration of the uterus at the slightest indication and without hesitation, however, certainly is justified. More liberal use of exploration could have prevented 5 of 20 cases of later hemorrhage due to retained placental fragments in this series.

Retention of placental tissue, unrecognized in the delivery room, may cause bleeding in the first few hours post partum, but, if not, gross hemorrhage seems unlikely to occur in the first few days of the puerperium. In this series late hemorrhage from retained placental fragments began between the fourth and fifteenth days. This is in agreement with the finding of Wolfe and Pedowitz; in their series bleeding occurred in most cases between the sixth and tenth days. It was noted in our study that major bleeding from any cause was conspicuously absent between the first and fourth days. Virtually all of the patients in this series were in bed for 5 days following delivery. It would be interesting to know whether early ambulation would give different statistics.

Hemorrhage in the late puerperium, in the absence of extrauterine pathology or pre-existing uterine abnormalities, has usually been attributed to (1) decidual separation,[9, 12] these hemorrhages occurring in the first 10 or 12 days, (2) abnormal involution of the placental site,[13, 14] and (3) retained placental tissue. The relative incidence of these has been reported with rather wide variations depending on the indications used for curettage. For instance, Erving and Power[10] reported the presence of placental fragments in only 10 of 134 curettage specimens; this low incidence is due apparently to the fact that all patients who had persistent heavy lochia as late as the eighth or ninth postpartum day were subjected to curettage. Contrasting with this broad indication for intervention, in our series operative management was reserved for the cases with gross hemorrhage which did not cease with bed rest and the use of oxytocics. With this as an indication retained placental fragments were found in 73 per cent of curettage specimens. When curettage was not done, the cause of bleeding could only be surmised.

A perhaps overly conservative attitude in the management of late puerperal hemorrhage in this series makes possible several deductions regarding the sequelae of retained placental fragments. Our findings indicate that once gross hemorrhage from retained placental tissue begins it will continue or recur at frequent intervals, despite the use of oxytocics, until the tissue is out of the uterus, and that spontaneous expulsion is unlikely to occur. Contrariwise, bleeding from other causes tends to be self-limited, as evidenced by the small number of these cases, 4, which finally required curettage. However, reservation of surgical management for cases in which there was persistent or recurrent heavy bleeding often involved observation for some hours or days in the hospital and resulted in notable increase in blood loss. Careful review of our cases indicated that immediate curettage of all patients with gross

late puerperal hemorrhage requiring hospitalization (doubling the number managed surgically) would have shortened the period of hospitalization in 8 cases, would have prevented shock in 4, and would have reduced the amount of blood replacement required in at least 6 cases.

Among the 12 cases of severe late hemorrhage due to retained fragments, persistent or recurrent hemorrhage was the only consistent symptom. It has been stated that continuation of heavy red lochia is usual with retained placental fragments prior to the onset of gross hemorrhage.[9, 10] This was not borne out in our series. The presence of an open cervix beyond the twelfth day post partum has generally been accepted as evidence that the uterus contained placental fragments.[1, 9] An enlarged uterus and an open cervix were consistent findings in all of our cases with retained placental tissue, including those examined later than the twelfth day; however, they were also noted in several cases of major puerperal bleeding when retained fragments were not present.

Small fragments not causing major blood loss, but resulting in prolonged lochia rubra or occasional episodes of bright bleeding, were usually cast off by the uterus some time after the sixth week. This is what might be expected in view of the completion of involution of the placental site at about the seventh week as described by Williams.[11] Placental fragments remaining attached to the uterine wall beyond the period of involution might properly be labeled placental polyps. None in this series was so classified.

It seems logical that a retained portion of placental tissue originates bleeding when it becomes partially separated as the process of involution reduces its area of attachment, leaving open vessels in this part of its bed. Partial detachment of larger fragments would tend to be effected earlier with the resultant hemorrhage heavier and more constant. The findings in this series support such an explanation. All the larger fragments caused considerable continued bleeding requiring removal in less than 2 weeks, whereas small fragments were more likely to cause prolonged and increased discharge of lochia rubra or intermittent smaller hemorrhages.

Abnormality of the clotting mechanism due to retained and degenerating trophoblastic tissue has been suggested as an etiological factor in late puerperal hemorrhage.[15] In our series no clotting defect was suspected, and removal of the retained tissue and use of a uterine pack were adequate treatment in cases requiring surgical management.

Conclusions

1. The occurrence and sequelae of retained placental tissue in 85 cases among 9,732 vaginal deliveries in the last trimester are reported.

2. Retained placental fragments play a minor but important role in immediate and early puerperal hemorrhage, accounting for 4.5 per cent of the cases in this series.

3. In contrast they play a major role in the causation of gross hemorrhage in the late puerperium, accounting for 44.4 per cent in this series. The incidence of retained fragments causing late puerperal hemorrhage of major degree was 1:811.

4. Areas of abnormally adherent placental attachment were present in a large number of cases with unusual bleeding, both early and late.

5. Cases with retained placental fragments causing late puerperal hemorrhage presented no differentiating symptoms and no diagnostic physical findings except on digital exploration of the uterus.

6. Early exploration of the uterus and curettage in all patients with gross late puerperal hemorrhage seems advisable because of the frequent finding of retained placental tissue, and the tendency of bleeding to persist in such cases until the uterus is emptied.

7. A liberal attitude toward exploration of the uterus in the immediate puerperium is recommended. Any abnormality in the third or fourth stage of labor or any defect of the secundines should be an indication for exploration.

8. Uterine tamponade is recommended for control of hemorrhage in the early or late puerperium when it is impossible to completely remove densely adherent placental fragments.

9. Hysterectomy was not required in this series for hemorrhage due to atony or retained placental tissue.

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Discussion

DR. FRED L. ADAIR, Maitland, Fla.—It is of course axiomatic that a clean and empty uterus is essential in the immediate and subsequent convalescence of a puerperal patient no matter at what period the pregnancy is terminated. In relation to hemorrhage, it hardly needs stressing that the prompt institution of such measures as blood replacement is of the first importance, and that the time factor is of as much importance as the qualitative and quantitative ones.

The prevention, recognition, and treatment of the retention of placental fragments as well are all of great importance in promoting a normal convalescence.

Hemorrhages from lacerations do not come under consideration in this connection though they may complicate the picture. Abnormal attachments of the placenta to the uterine wall as in placenta accreta are rare complications and require special recognition and treatment and certainly do not loom large in the problem of retained placental fragments.

It is obvious that when the fetus is delivered the volume of the uterus is diminished and the intrauterine pressure on the placenta is lessened. The uterine muscle underlying the placenta contracts and lessens its surface area, thus tearing through the spongiosa and compressing the vascular sinuses of the uterine wall and separating the placental disc.

Bleeding, in the absence of trauma and neoplastic disease, comes from the vessels of the placental site so that interference with normal separation of the placenta provokes bleeding. Complete separation and removal of placental tissue are essential for prevention of immediate and late uterine bleeding.

DR. HUGH J. BICKERSTAFF, Columbus, Ga.—Among several points that provoke speculation, inquiry, or comment, are the following:

1. One out of 14 parturients bled in excess of 300 c.c. within minutes to days following completion of the third stage of labor. One among every 114 patients was proved, either immediately or subsequently, to have retained placental fragments. Allowance for cases in which such fragments may not have been identified justifies the assumption that the true incidence is perhaps somewhat greater.

2. A significant relationship becomes most apparent in bleeding which occurred after transfer from the delivery room. Among the puerperae who bled excessively following transfer, retained fragments were discovered in one-fourth (and in nearly half of the late hemorrhage cases), as compared to a frequency of 1 in 114 among the exposed-to-risk group as a whole. And striking indeed is the finding that, of 24 patients who left the delivery room with placental fragments in the uterus, 22 had hemorrhages of large volume at some later time. This is a compelling indication of the value of the liberal employment of fourth-stage exploration of the uterus and of prompt exploration, evacuation, and packing whenever bleeding does occur, as recommended by the essayist.

3. As regards factors predisposing to the occurrence of hemorrhage: (a) There is no mention of myomas. Our observation has failed to show any consistent association between the presence of these tumors and the sequelae of either excessive delayed hemorrhage or retained secundines. I wonder what may have been the situation in this large series with respect to fibroids. (b) Disregarding varying degrees of placenta accreta, did the authors identify any significant proportion of their 182 patients, who required manual removal of the placenta, among the "bleeders" or the "fragment retainers"? (c) Mention is not made of the incidence of fragment retention or of hemorrhage related to the gestational age at labor. Although not documented, it is our experience that retained secundines, placental polyps, "placental site" or general subinvolution, prolonged lochia, and delayed or remote puerperal bleeding are all quite likely to appear in an order of frequency increasing with the prematurity of delivery. Do the essayists' data permit of the confirmation or refutation of this commonly assumed association?

4. Regarding possible contributing factors of management: In recent years the authors have practiced an accelerated management of the third stage of labor. With variation in details so have we, and I venture to say this is the case with most of those present. We have ascertained to our complete satisfaction that the total blood loss of delivery is thereby reduced, by approximately one-half; that repairs are more promptly started and more rapidly completed, thus materially shortening the period of anesthesia and further minimizing atony; and that an occasional entrapment of placenta or membrane is annoying (and rarely infuriating) to the hungry or sleepy accoucheur. We have failed to see any evidence, however, one way or the other, of increased or decreased likelihood of remote retention or of delayed bleeding, as compared to our experience prior to adopting accelerated management. Would the authors comment concerning their opinion in this respect?

5. In 583 parturients (one in 17) the postpartum uterus was invaded, no antibacterial agents were administered prophylactically, and not one serious complication ensued. Our practice in this respect is quite similar except for a slightly greater frequency of such examinations, principally because of more frequent tamponade. It is our common practice to pack whenever the vagina is not dry to a 3 or 4 sponge dam for repair, even when an intact cervix, inspection of the placenta and membranes, probabilities of trauma, and the amount of bleeding are all insufficient to indicate exploratory palpation. Under appropriate conditions of cleanliness, using a Holmes or Torpin packer, and with judicious

attention to the integrity of the cervix and uterine cavity, we agree that exploration and tamponade are not only innocuous, but of distinct advantage, despite expressed opinions to the contrary.

DR. JOHN PARKS, Washington, D. C.—It seems appropriate to ask what type of placental, third-stage acceleration the authors used. Nobody cares very much about the placenta. The patient likes to be rid of it, but the obstetrician does not have to resuscitate the placenta. He frequently just throws it away.

Observations indicate there are three current methods, all of them acceleration methods really, of ridding the patient of her placenta. One is the "catch it if you can" method in which a great deal of pressure is placed on the top of the uterus. A basin is placed over the perineum and if possible the placenta is caught. Frequently the basin is put away without any inspection of the placental surfaces.

The second method is the "pull the cord method." The obstetrician starts pulling on the cord or the next thing he can get hold of. Often he ends up taking placenta and membranes out in pieces. There are times when manual removal of the placenta is necessary, but such occasions will be increased by pulling on the cord.

One of the founder members of this Association, the late Dr. C. P. Andrews, really wrote one of the most descriptive American papers on the proper management of the third stage of labor in which he said that the placenta should be expressed into the lower segment. From there on the uterus should be pushed back upward with a bit of suprasymphysial pressure and the placenta delivered into the hands of the obstetrician, up and away from the rectum. This is the method I have tried to practice and it is, in my experience, by far the best method.

The obstetrician is just as responsible for the placenta as he is for the baby. He should lift the placenta up; inspect all of its surfaces, and all of its membranes. If there is any doubt whatsoever of retained fragments he must manually palpate the uterine surface immediately. Placenta left in the mother may leave the baby without a mother.

The high percentage of packing performed by the authors is open to question. This is an operator's choice. Another revered past member of this Association, Dr. Williams, once said when there is anything in the uterus, placenta or clots, put your hand in there and remove all the clots and placenta, but leave your hand in until the forces of the uterus are such that you are afraid you cannot quite deliver your hand. I agree. If one waits for contraction of the uterus and if all the clots and placental materials are out of the uterus, one rarely has to resort to packing. Considering the number of uteri packed, the authors are to be commended on their low morbidity rate.

DR. FRANK R. LOCK, Winston-Salem, N. C.—I think those of us who are in teaching positions are often accused of following principles selected on the basis of the fact that we are in teaching positions, and that we are instructing students. This is not true. We follow the principles which are safest and, in our opinion, in the best interest of our patients.

I am quite concerned that every member of this organization and every trained obstetrician and gynecologist is actually a teacher in his community. The standards he sets and his practices are usually considered good in that community since, as a trained obstetrician and gynecologist, he is a leader.

The strong trend toward acceleration of everything in our management of the obstetric patient causes me great concern. We are almost in an age where acceleration of labor, acceleration of delivery by the use of forceps, and acceleration of the third stage of labor has become such a vogue that a great many people actually never see simple, uncomplicated and normal, spontaneous first, second, and third stages of labor.

I feel very strongly that there is no place for routine in the management of the third stage of labor. In the patient who has had a rapid, normal, progressive labor, early administration of oxytocics is very frequently fraught with abnormal contractions that are entirely unnecessary. In contrast, those patients who have not had good labor, who have had some degree of inertia, and have been subjected to traumatic delivery or deep anesthesia, are certainly candidates for the early use of oxytocics.

DR. LESTER (Closing).—In reply to Dr. Parks and Dr. Lock: except for the use of oxytocics in the third stage, which has been a routine procedure with us in patients who are under anesthesia, there has been no "acceleration" of the third stage. We do not feel that the incidence of hemorrhage from retained placental fragments has been increased by this use of oxytocics in the third stage. I think that retained placentas are a little more common when oxytocics are given; there is more likely to be a contraction ring; but if the placenta is carefully examined and if the uterus is explored following every abnormal third stage of labor then the chance for retained fragments to cause trouble later would seem to be minimal.

In answer to Dr. Bickerstaff's question, uterine myomas were not an important factor in immediate hemorrhage and were not associated with retained placental fragments or with delayed hemorrhage in any case.

Manual removal of the placenta did not seem to predispose to later hemorrhage; however, in one case a retained placental fragment with delayed hemorrhage did follow manual removal of the placenta. It is certainly true that manual removal of the placenta should be followed by reinsertion of the hand into the uterus for exploration for retained placental fragments or trauma.

Only one of our patients with gross late hemorrhage from retained fragments was less than eight months pregnant. Whether prematurity was a factor in delayed hemorrhage from other cause I am not able to say.

I have no data, as I have said before, on whether the use of oxytocics in the third stage makes the retention of placental fragments more likely.

I do not believe time will allow any further discussion of uterine tamponade except to state that for us it is a very useful procedure without harmful sequelae and that among these 9,700 cases there were no deaths from hemorrhage and hysterectomy was not required except in one case with a tear in the lower segment.

THE ROUTINE COLPOTOMY*

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EXTRAUTERINE pregnancy remains a common condition in a time which has seen many of the complications of pregnancy considerably reduced. Very little documentation is needed to acquaint this group with the fact that ectopic pregnancy can present signs and symptoms simulating almost any abnormal condition in the pelvis. Its manifestations are so varied that it has won the reputation of being the most fascinating condition in gynecology.

Not many data are available to show how frequently an abdomen is opened, with the preoperative diagnosis of extrauterine pregnancy, only to disclose some other condition present which would not require laparotomy. Beacham and Beacham[1] reported that prior to 1947 at Charity Hospital an accurate preoperative diagnosis of ectopic pregnancy was made in less than 65 per cent of the suspected cases. Bell and Ingersoll[2] found in their study of the cases at the Massachusetts General Hospital that the correct rate of preoperative diagnosis of ectopic pregnancy was 52 per cent. Also, it is very difficult to find published experience on the length of time some cases have been under treatment for various conditions when the real pathology was an extrauterine pregnancy.

The diagnosis of an acute abdominal crisis caused by hemorrhage is usually not difficult to make and the indication for laparotomy is clear. This condition will not be considered in this report. Diagnosis is a real problem in the case of suspected ectopic pregnancy. In the management of this type of case colpotomy is of great value in establishing the diagnosis early.

The following brief case summaries give examples of instances when the colpotomy procedure would have been very desirable:

CASE 1.—A 22-year-old para i, gravida i, was admitted to the hospital on May 1, 1952, because of pelvic pain and scant vaginal bleeding of 3 days' duration. The last menstrual period began on April 1, 1952, and was normal. On examination there was an exquisitely tender mass in the right adnexal region. After consultation, a laparotomy was done for tubal pregnancy but acute salpingitis was found.

CASE 2.—A 26-year-old nulligravida was admitted to the hospital on Sept. 28, 1952, because of intermittent vaginal bleeding, lower abdominal pain, and dyspareunia since July 15, 1952. There was a 5 cm. slightly tender mass in the right adnexa. A curettage and laparotomy were done on Sept. 29, 1952, for ectopic pregnancy but the findings were chronic endometritis and an enlarged ovary.

CASE 3.—A 23-year-old nulligravida was admitted to the hospital on Oct. 3, 1952, because of lower abdominal pain and brownish vaginal discharge since her last menstrual period which began on Sept. 16, 1952. On examination there was a markedly tender 5 cm. mass in

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the right adnexa. The patient was observed for 5 days and treated for pelvic inflammatory disease. The mass became larger (6 cm.) and there was more tenderness. At laparotomy on Oct. 8, 1952, a 150 c.c. pool of unclotted blood was found, caused by a ruptured corpus luteum.

CASE 4.—A 27-year-old para i, gravida ii, whose last menstrual period was Jan. 1, 1952, was admitted to the hospital on Feb. 27, 1952, with vaginal bleeding since Feb. 21, 1952. Prior to admission she had severe lower abdominal cramps and profuse bleeding, and reported that she had passed part of the pregnancy. Examination showed a moderate amount of dark bleeding, the cervix closed, and the uterus posterior, slightly enlarged and tender on motion. On March 3, 1952, after consultation, a curettage was done. The scrapings showed chronic endometritis and the patient was discharged on March 6, 1952, improved. She was readmitted on March 17, 1952, with lower abdominal pain and vaginal bleeding. The pelvis was filled with a large, tender mass. At laparotomy approximately 500 c.c. of blood was found, walled off by adhesions. The tubes were greatly enlarged and both were removed. There was a right tubal pregnancy and a left hemosalpinx.

CASE 5.—A 31-year-old para iii, gravida iv, was admitted on June 16, 1952, with a history of lower abdominal pain and vaginal bleeding since her last menstrual period on May 30, 1952. Her temperature was 101° F., there was moderate vaginal bleeding, and the uterus was anterior and slightly enlarged. There was mild tenderness in each adnexal region. On June 19, 1952, a curettage was done and microscopic examination showed chronic endometritis. The patient was discharged on June 21, 1952, improved and without symptoms. She was readmitted on June 28, 1952, with vaginal bleeding and moderate abdominal pain. A laparotomy was done on July 3, 1952, and a left tubal pregnancy was removed.

CASE 6.—A 32-year-old para ii, gravida iii, whose last menstrual period was Feb. 21, 1952, was admitted on another service on April 12, 1952, with a history of vaginal bleeding of 3 weeks' duration and lower abdominal pain. The uterus was slightly enlarged and there was some tenderness in the pelvis but no adnexal mass was palpated. The patient was discharged on April 14, 1952, with the diagnosis of early threatened abortion. She was readmitted on April 28, 1952, with vaginal bleeding and lower abdominal pain. There had been profuse bleeding since April 26. Examination showed an abdominal and pelvic mass reaching 10 cm. above the symphysis. At laparotomy a left tubal pregnancy was found.

These cases are mentioned to illustrate that the correct diagnosis of an early extrauterine pregnancy can be baffling. The more one keeps ectopic pregnancy in mind the more laparotomies he will do for other conditions. The less one thinks about ectopic pregnancy the longer it will take him to make the correct diagnosis. Practically all extrauterine pregnancies, if allowed to continue long enough, will make themselves evident and demand laparotomy. The usual methods of diagnosing these cases, such as history and findings, pregnancy tests, repeated blood counts, re-examinations, and curettage of the uterus, are not only time consuming but lack positiveness. With the exception of laparotomy, colpotomy is the only procedure which seems to give the earliest correct diagnosis.

Since 1952, when the cases just cited were handled, it has become almost routine in my practice to do a colpotomy on any woman in the childbearing age group who appears with pelvic pain and unusual vaginal bleeding from other than some obvious condition.

Materials and Methods

The process of management of these suspected extrauterine pregnancy cases was to admit the patient to the hospital and, except in 4 instances, all opera-

tions were done within 48 hours after admission. The scheduled operation was a dilatation and curettage, posterior colpotomy, and possibly laparotomy. The double setup was used. A curettage was done because of the bleeding and this was sometimes done prior to the colpotomy and sometimes afterward, when no pathology was found in the cul-de-sac.

The technique of the colpotomy is a simple one. With the patient in the lithotomy position the posterior lip of the cervix is grasped with a tenaculum and elevated. With long tissue forceps the mucosa of the posterior fornix is grasped approximately 2 cm. from its reflection off the cervix. Long curved scissors are used to cut through first the mucosa and then the peritoneum. The wound is enlarged laterally either by snipping with the scissors or by spreading with 2 fingers. The Sims speculum is placed in the opening and retracted posteriorly. The contents of the cul-de-sac are noted and inspection of the adnexa is carried out. This is done by inserting a sponge forceps with sponge up into the lateral portion of the pelvis and then sweeping anteriorly and inferiorly. This usually brings the ovary into view and from it the corresponding tube can be located and inspected. Only occasionally is it necessary to use a tenaculum on the posterior surface of the uterus for manipulation. The wound is closed with one continuous suture which approximates the mucosa and the peritoneum.

Thirty-four colpotomy cases are reviewed, all of which are from private practice. The youngest patient was 16 years of age and the oldest 42. Table I shows the symptoms and findings on examination in these cases. Thirty-two patients had vaginal bleeding and 26 had a palpable adnexal mass. There were 7 tubal pregnancies in this group.

TABLE I. SYMPTOMS AND FINDINGS

	COLPOTOMY CASES	ECTOPIC PREGNANCY PRESENT
Number of cases	34	7
Skipped or unusual menstrual period	21	6
Pain	27	6
Bleeding	32	6
Pelvic mass	26	7

Table II shows the main finding at colpotomy. In a third of the cases nothing unusual was found in the cul-de-sac or in the adnexa. Free blood was found in 10 cases of which 7 were due to ectopic pregnancy. One tubal pregnancy was removed through the vagina and the others by laparotomy. In 1 case 120 c.c. of blood was found in the cul-de-sac and the tubes could not be visualized. A laparotomy was done but no tubal pregnancy was found. The condition was uterine bleeding from nonsecretory endometrium and retrograde flow through the tubes was demonstrated at the time of operation. Clear yellow fluid and definite evidence of inflammation were the next most common findings.

TABLE II. FINDINGS AT COLPOTOMY

Operations.—	
Routine colpotomy	34
Dilatation and curettage	33
Laparotomy	7
Main Finding at Colpotomy.—	
Nothing	12
Blood	10
Clear yellow fluid	4
Inflammation	3
Corpus luteum	2
Ruptured follicle	2
Ovarian cyst	1

Table III shows the final diagnosis in the 34 cases. Chronic endometritis, tubal pregnancy, endometrial hyperplasia, and incomplete abortion, all conditions notorious for causing unusual vaginal bleeding, accounted for most of the cases.

TABLE III. DIAGNOSIS

Chronic endometritis	9
Tubal pregnancy	7
Endometrial hyperplasia	7
Incomplete abortion	6
Ruptured follicle	2
Menstrual endometrium	1
Serous cyst	1
Secretory endometrium	1

Since the policy of routine colpotomy has been instituted there has been but one instance, as noted below, of a second surgical procedure being required subsequently. Also, with the exception of the previously mentioned case, there has been no unnecessary laparotomy when this condition was thought to be present.

A 25-year-old para i was admitted to the hospital on Feb. 16, 1953, with the history of a skipped menstrual period, lower abdominal pain, and vaginal bleeding. Examination showed vaginal bleeding but no pelvic mass was palpable. On Feb. 17, 1953, a curettage and colpotomy were done and 30 c.c. of straw-colored fluid was found in the cul-de-sac. In this instance the tubes were not visualized but one ovary was found to be enlarged. This was considered to be a case of incomplete abortion; however, the tissue sections showed only acutely inflamed degenerating decidual tissue and chorionic material was not found. After discharge from the hospital the patient continued to have vaginal bleeding and lower abdominal pain. She was readmitted on March 10, 1953, and examination showed an adnexal mass 5 cm. in diameter. A laparotomy was done for an ectopic pregnancy which was supposedly missed at the time of the colpotomy, but the findings were only the previously mentioned enlarged ovary and a mild acute salpingitis.

Complications

There were no serious complications in these colpotomy cases. The average hospital stay following colpotomy and without ectopic pregnancy was 3.1 days. With an ectopic pregnancy and colpotomy the average stay was 7.6 days. The longest postoperative stay following colpotomy without ectopic pregnancy was 7 days and this was in the case in which the laparotomy was done and no ectopic pregnancy was present. The longest stay with ectopic pregnancy and colpotomy was 9 days. There was no morbidity in the absence of ectopic pregnancy but one patient with ectopic pregnancy had a febrile course.

On two occasions the rectum was inadvertently entered during the operation. In the first case the rectum was entered because the cul-de-sac was apparently obliterated. This patient's primary condition was found to be an incomplete abortion. The opening in the rectum was closed and she was discharged on the fifth postoperative day in good condition. This patient subsequently delivered a normal full-term infant 12 months later. In the other case, it was felt that the incision was made too far posteriorly. The rectum was closed and a new incision was made 1 cm. nearer the cervix. This patient had an ectopic pregnancy and a large amount of blood was found in the cul-de-sac. The postoperative course was uneventful and she was discharged on the eighth postoperative day.

An unusual complication occurred in one case after the patient's discharge on the second postoperative day. Two days later she was seen in the emergency room with a temperature of 101° F. and severe lower abdominal pain. The history was that she had given herself a tap-water douche and this was followed

by the severe pain. Examination showed that the colpotomy wound was separated slightly in one area and clear fluid was draining from the opening. She responded well to treatment and was discharged 4 days later.

Summary

Ectopic pregnancy is a fascinating condition the diagnosis of which can be baffling. In order to make the diagnosis early, without the use of laparotomy, the posterior colpotomy seems to be a most advantageous procedure. Its routine use is recommended in cases where there is a possibility of ectopic pregnancy.

References

1. Beacham, D. W., and Beacham, W. D.: New Orleans M. & S. J. 103: 283, 1951.
2. Bell, J. W., and Ingersoll, F. M.: Am. J. Obst. & Gynec. 60: 174, 1950.

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Discussion

DR. J. L. ALLGOOD, JR., Jacksonville, Fla.—Beginning with the early papers on ectopic pregnancy of Parry and Schauta, extending through the World War I era of Smith and Heaney, and entering into our present time of so-called "modern medicine," there have been many hundreds of reports on ectopic pregnancy and on the related subject of posterior colpotomy. Dr. Caldwell adds an interesting series of 34 cases of colpotomy in private practice.

Colpotomy is a major surgical and anesthesiological procedure, involving all the attendant problems of anesthesia, hemorrhage, infection, and possible injury to adjacent structures. It bears a morbidity and a mortality rate, and should not be used as an aid to the diagnosis of ectopic pregnancy, but should be employed in selected cases to confirm or disprove the diagnosis of early ectopic pregnancy. Our procedure in the management of the colpotomy candidate is as follows: A patient with unilateral pain or soreness, with or without adnexal fullness or mass, and with or without vaginal bleeding, is told of the possibility of ectopic pregnancy. Arrangements are made to examine the patient at frequent intervals in the office, and to meet her at the hospital in event of unusual or increasing pain, weakness, or vaginal bleeding. In a group practice of 3,500 obstetrical patients in seven years we have employed colpotomy in only 5 cases. There have been no obstetric deaths. We believe we have saved many patients the hazards, expense, and inconvenience of the routine colpotomy.

We believe that the curettage should not be employed as a routine procedure associated with colpotomy. Indications for dilatation and curettage should remain standard, such as profuse bleeding, or incomplete or inevitable abortion; otherwise an occasional intrauterine pregnancy will be inadvertently terminated. We have seen one case of tubal pregnancy associated with intrauterine pregnancy and vaginal bleeding; in this case removal of the affected tube resulted in recovery of the patient, and was followed subsequently by normal vaginal delivery at term. Obviously a dilatation and curettage at the initial colpotomy would have terminated the pregnancy of this patient who had an associated threatened abortion. Everyone has seen patients with bleeding in the first trimester; the bleeding stops, and the normal course of pregnancy proceeds to term. Curettage should not be used in such cases, whether or not colpotomy is used.

The inadvertent opening of the rectum in 2 cases out of 34 results in a rectal injury rate of 5.9 per cent, which is too high. We would consider this a serious complication, and would hope not to enter the rectum during a colpotomy procedure. It is recognized, however, that no one knows the difficulties associated with the surgical procedures reported here, except the operating surgeon who was present.

The colpotomy should not be a routine. Such procedures should be reserved for use, in most instances, in clear-cut, definite cases of possible early ectopic pregnancy. The posterior colpotomy remains a worth-while procedure in selected cases.

DR. WALTER L. THOMAS, Durham, N. C.—At a meeting of the South Atlantic Association a few years ago a good friend of mine remarked to me that he was considering publishing a paper on 13 unruptured extrauterine pregnancies which he had diagnosed and operated upon. I naturally asked him how the diagnosis was made. He replied that he had suspected the disease and had performed laparotomy. My next question was: How many patients were subjected to laparotomy who did not have an unruptured gestation? He admitted to around 150 women. He has never published his series to my knowledge!

Exploratory laparotomy for "suspected so and so" should be *obsolete* in this day and time. We have such valuable aids to diagnosis that only rarely should we be operating without a very accurate diagnosis. Cytologic, colposcopic, culdoscopic, hysteroscopic, and hysterosalpingographic examinations are available to most of us.

Posterior colpotomy, in my opinion, is not only one of the better aids for exact diagnosis but this procedure also affords us the chance in many instances to carry out a therapeutic operation at the same time. We employ posterior colpotomy in most cases to confirm or refute the suspected diagnosis of ruptured tubal pregnancy as does Dr. Caldwell. We also find it ideal then to remove the involved tube through the same vaginal incision. If a hematocele is present, it is easily evacuated and the uterus is delivered posteriorly into the vagina. The tube is then pulled down by traction on the uteroovarian and upper broad ligaments. Adhesions are usually easily freed by the finger or scissors. If it is impossible to deliver and excise the tube through the colpotomy incision, nothing has been lost by the effort but a little time as the approach then is made by the abdominal route and the necessary surgery carried out. We have found that if wider visualization becomes necessary through the colpotomy incision or, as frequently happens, if therapeutic procedures are indicated, additional space may be obtained by stretching the angles of the incision or by primary ligation and cutting of one or both of the uterosacral ligaments. During closure of the incision, these ligaments are reattached in their normal position.

We also find posterior colpotomy very useful for establishing the diagnosis and in treatment of other pelvic pathologic conditions such as pelvic abscess, small dermoids, single or multiple benign cysts, small fibromas, etc. Accurate visualization by manipulation is the key to success.

The cure of ovarian malignant disease depends completely upon its early diagnosis. The delay caused by the patient's or the surgeon's contemplation of exploratory laparotomy may cost the woman her life. Women accept intravaginal exploration more readily because it leaves no visible scar and there is less pain postoperatively. If a diagnosis of ovarian malignant disease is then made, further and adequate therapy is carried out through the abdomen.

Dr. Caldwell has cited six instances whereby the woman might have been spared a laparotomy if a colpotomy procedure had been first performed. Who knows how many women in this great country of ours would each week be spared unnecessary laparotomies by a *meticulous preoperative diagnostic study?* Scarcely a day passes that I do not see some woman who has had a laparotomy performed by a surgeon who told her preoperatively that she had a pathologic condition, the exact nature unknown to him, but that he would perform celiotomy and "sort of look around and see what is necessary to be done." This approach required less mental and physical effort and was less time consuming for him. To cap the climax, when no significant pathologic change is found, the same surgeon will then proceed with an appendectomy and perform some "piddling" and often harmful operation upon the innocent ovaries, tubes, or uterus, to justify his operation.

Dr. Caldwell, we not only recommend your colpotomy but we think that any man who fails to use such a fine diagnostic and often therapeutic procedure is missing the opportunity for great service and satisfaction both to his patient and to himself. Posterior colpotomy is a marvelous aid. There is very little danger associated with the procedure. I would dislike very much to practice without it.

DR. FRANK R. SMITH, New York, N. Y.—I object to this term, "routine" colpotomy. I am sure the speaker means "routine" in suspected instances. I do not think the col-

potomy always leaves the patient with as painless a vagina as we have been led to believe. We are all familiar with the process of colpotomy and with the aspiration method. I use both but prefer colpotomy. I am a little ashamed to admit that I have chosen a colpotomy to remove an ectopic pregnancy as has been mentioned. I think it is a little like surgical calisthenics and that one is being somewhat of a "smart alec" when one does it.

I am going to strike a note here which is not exactly favorable to the trend of this fine conservative group. I heard with interest Dr. Thomas quoting a man who had done something like 115 unnecessary laparotomies. That, of course, is a little excessive, but I would prefer, on any service of which I had charge, that the surgeons open the abdomen on many occasions which were unnecessary rather than miss an unruptured ectopic pregnancy because the aspiration needle did not get some blood or the colpotomy did not. Of course, if you bring the whole uterus out through the vagina and look around and see whether the gall bladder is diseased or what not, you are going to find out if the tubes are normal or pathologic. At Roosevelt Hospital we have quite a Puerto Rican clientiele with numerous ectopic pregnancies, and missed abortions, and all sorts of things associated with sexual life. Our troubles have come when we have been quite sure we did not have an ectopic pregnancy and the patient has been put back to bed, or allowed to go home, and the unruptured ectopic pregnancy ruptured and the patient returned. This past year we had two patients to whom this happened and they lived. We came very near losing them after colpotomy in which apparently the young attending and resident had not thoroughly ruled out the pathology of the tube which was adherent and didn't come down as easily as they do in Chicago. However, I believe in individualizing rather than making the procedure a routine one.

DR. C. GORDON JOHNSON, New Orleans, La.—The mortality, due to ectopic pregnancy, at New Orleans Charity Hospital from 1919 to 1936 was 51 deaths, or 11.4 per cent. Many of these deaths were diagnosed at autopsy, the patients not having been operated upon. From 1937 to 1950 things were a little better; there were 18 deaths, or 2.6 per cent. From January, 1951, to July, 1954, there was only one death in 255 cases. This death occurred in the emergency room before the patient was admitted to the hospital. This precipitous drop in mortality we feel can be explained in several ways; one of the most important is that our residents are trained to be "ectopic minded." We also feel that by means of cul-de-sac puncture we are able to make a diagnosis preoperatively in more cases.

I have a slide showing the technique of cul-de-sac puncture. As you can easily see it is a very simple procedure, requiring only an 18 gauge spinal needle and a 50 c.c. aspirating syringe. We feel that this procedure has several advantages over colpotomy, the main one being that it does not require anesthesia or an operating room. Cul-de-sac puncture can be done safely in the clinic, on the ward, in the doctor's office, or even in the patient's home. We are of course not trying to compare the type of patients seen at Charity Hospital with those we see in private practice, but all of the doctors on the Tulane Service do use this procedure in their offices.

Cul-de-sac aspiration will show the presence of blood, pus, clear peritoneal fluid, and occasionally cloudy fluid that will congeal on removal, such as that seen in a dermoid cyst.

One of our residents recently reviewed the number of cul-de-sac punctures that were done in 1954 on the Tulane Service at New Orleans Charity Hospital. One thousand cul-de-sac aspirations were done in 717 patients. In 59 instances, blood, which failed to clot within 6 minutes, was obtained. Pus was obtained in 30 instances. In 527 aspirations clear peritoneal fluid was recovered and 101 aspirations resulted in a dry tap. I am sure that you all want to know how many actually had a proved ruptured ectopic pregnancy. Fifty-six of the 59 patients were operated upon abdominally. Two of the 3 patients who were not operated upon had an aspiration of a hematoma of vaginal cuff. The blood from the third patient who was not operated upon was considered to originate from an endometrioma. Forty-five patients of 56 who were subjected to surgery were proved to have ruptured extrauterine pregnancies. In 3 patients no bleeding foci were demonstrated at laparotomy. The remaining 8 had bleeding from a corpus luteum, a corpus hemorrhagicum, or from an acute inflammatory cyst. The preoperative diagnosis of intra-abdominal bleeding was therefore

correct in 53, or 95 per cent, of 56 patients on whom surgery was performed. The preoperative diagnosis of ruptured ectopic pregnancy was correct in 45 cases, or 80 per cent.

We employ colpotomy in most instances only for treatment of cul-de-sac abscesses. We have been asked on several occasions why we do not employ colpotomy for removal of a ruptured tubal pregnancy. Our answer to this question is that most of our ectopic pregnancies occur as a result of pelvic inflammatory disease. In such instances we do not feel that we can safely handle an ectopic pregnancy by the vaginal route. Therefore we seldom use colpotomy for diagnosis or for treatment of extrauterine pregnancy.

DR. CALDWELL (Closing).—There is no one who likes to do a laparotomy any more than I do. My only trouble was that my ego was hurt when I had made the wrong diagnosis and had to explain to the patient that I was mistaken. That was one of my reasons for the trend to a more conservative procedure for diagnosis.

Possibly the word "routine" was put in here to attract attention to certain cases. We have routines in our hospitals now and are getting more and more of them. We have the routine white cell count, serologic test, and many hospitals require routine x-ray of the chest, all of which are helping us diagnose by the use of the "By-Laws." Possibly the future will bring a crystallization which will end up with the centesis of the cul-de-sac as the routine procedure and if blood is obtained then the colpotomy. By that method one may omit doing a laparotomy in cases of bleeding from a ruptured corpus luteum, retrograde flow, or from rupture of a follicle.

THE FUNCTION OF A TISSUE COMMITTEE IN OBSTETRICS AND GYNECOLOGY*

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THE purpose of this paper is to outline the function of a tissue committee in the obstetrical and gynecological departments of a 185 bed hospital located in Greenwood, South Carolina, a city of twenty-five thousand people. Prior to 1951, medicine was practiced by some twenty physicians in another 90 bed institution, the Greenwood Hospital. The entire staff was a closely knit group over which active supervision was provided by the senior members of the staff. Two of the senior members were recognized and referred to as Fellows of the American College of Surgeons.

The Self Memorial Hospital was opened in November, 1951, and with its opening several new physicians established practices in Greenwood and sought hospital privileges. The obstetrical and gynecological staff is now composed of fourteen physicians. Four of these are certified by the specialty boards and five others are members of the American College of Surgeons. The increase in the staff and the requests of the new physicians for recognition of their previous training made it mandatory that rules be established for the operation of the staff, since in the Greenwood Hospital no by-laws had previously existed.

The by-laws in the Self Memorial Hospital provided that all members performing major surgery must have the qualifications established by either an American Board or the American College of Surgeons. A "grandfather" clause was necessarily included to protect all the individuals who had had major surgical privileges in the Greenwood Hospital. The inspector for the American College of Surgeons recommended, at the time of his inspection, in May, 1953, that a tissue committee be established. The staff recognized this need and promptly appointed such a committee.

This committee has attempted to review all cesarean sections, sterilization procedures, therapeutic abortions, and exploratory laparotomies in which no tissue or normal tissues were removed. Since its origin, 134 obstetrical and gynecological cases have been reviewed. During the first eighteen months of the operation, eleven critical letters were sent to members of the staff. Eight letters were sent because the charts were too inadequate to justify the surgery and three because it was felt that the physician should have requested consultation for both his and the patient's benefit. The work done in the obstetrical and gynecological departments has been reviewed in an attempt to evaluate its merits and to estimate the influence of a tissue committee on the end results.

The cases reviewed include all those treated by the staff of the Self Memorial Hospital since its opening date. Only the charts of this hospital are complete

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and available for study. In a few instances only the total number of operations performed during the year 1951 in the Old Greenwood Hospital are listed. The Self Memorial Hospital does have the numbers of the cases treated in the Greenwood Hospital prior to 1951, though the complete charts are not available. These figures are included to help establish a more accurate base line on which to compare the influence of the tissue committee's operation.

Total Number of Cases and Consultations.—A study of the total number of patients admitted to the departments (Table I) and the number of consultations sought each year, discloses that there is a decrease in the number of gynecological cases and a very definite increase in the number of consultations. I believe that this represents a change that can be credited chiefly to the tissue committee. Before the establishment of the tissue committee the records were mostly inadequate and the physical examinations were recorded in a very sketchy manner. Now, more detailed and pertinent information is included on the charts.

TABLE I. ANALYSIS OF OBSTETRICAL AND GYNECOLOGICAL ADMISSION, AND PER CENT OF CONSULTATION

YEAR	NO. OF CASES	CONSULTATIONS	PERCENTAGE
Obstetrical Delivered.—			
1951	696	7	1.0
1952	772	8	1.0
1953	742	19	2.4
1954	771	47	6.0
Obstetrical Not Delivered.—			
1951	198	15	7.0
1952	174	10	5.7
1953	181	20	11.0
1954	179	29	16.9
Gynecological.—			
1951	578	4	0.6
1952	571	9	1.5
1953	487	20	4.1
1954	479	64	13.3

Cesarean Sections.—The tissue committee required a consultation in all operations performed except in the cases of repeat cesarean section. Tubal ligation has been left to the discretion of the physician, provided he secures written permission from the husband and patient. The figures in Table II show a decrease in the number of sections performed. If the requirements for consultations had been in effect, in the year 1952, 21 of the 48 operations performed in that year, would have had consultation. This represents 41.7 per cent of these cases. In 6 cases in 1954 the attending physicians failed to procure the consultations required by the rules of the committee. The committee, however, reviewed 4 of these cases and considered them justified. One case of breech presentation in a patient with a borderline pelvis, and a case in which slow fetal heart tones were observed, were not reviewed by the committee. These 6 cases represent 16.1 per cent of the cases which should have had consultation.

TABLE II. INCIDENCE OF CESAREAN SECTION AND PER CENT OF CONSULTATION

	CASES		CONSULTATION	
YEAR	NO.	RATE	NO.	PERCENTAGE
1951	51	7.3%	--	--
1952	48	6.2%	14	29.1
1953	37	5.2%	19	51.3
1954	37	4.8%	23	62.1

The committee reviewed the indications for 43 of the sections. Three letters were sent for inadequate charts which failed to justify the sections. Another letter was sent concerning the indication for a tubal ligation in a 20-year-old girl who had her third section.

Hysterectomy.—We note in Table III a decrease in the total number of operations performed. The tissue committee was also responsible for a great change for the better in the recorded histories. All charts of the hysterectomies were reviewed, however, to determine the correlation between the admitting, preoperative, and postoperative diagnoses. The charts show that between 35 and 40 per cent of the admitting and preoperative diagnoses failed to agree with the postoperative or discharge diagnoses. After discussion of this discrepancy with members of the staff, it is felt that this more properly should be attributed to poor chart work than to an inadequacy in diagnosis. There had not been any improvement in this since establishment of the tissue committee, and understandably so, since the committee has not considered it to be within its province to check all records in which such a discrepancy existed. The pathological findings are difficult to interpret as the tissue committee was created about the time our hospital pathologist arrived. The interest of the pathologist in our work is reflected by an increase in both the length of the pathological descriptions and the number of pathological diagnoses. The pathologist has stimulated increased interest in Papanicolaou smears. This has been reflected in the charts, by more instances in which the patients' cervices had had a Papanicolaou smear or biopsy. The committee reviewed 11 of the total number of hysterectomies performed and only one case drew a letter because of an inadequate history.

TABLE III. NUMBER OF HYSTERECTOMIES

	PANHYSTERECTOMY	PARTIAL HYSTERECTOMY
1951	102	21
1952	145	16
1953	86	14
1954	107	4

Uterine Suspension.—The figures in Table IV record the greatest change in the type of gynecological surgery that has occurred, and accounts for a sizable decrease in the total number of operations performed. Furthermore, there is no indication that these patients are being treated by other forms of surgery. The histories prior to the tissue committee record the use of a pessary before operation in only 6.7 per cent of the cases, but a pessary was used in 50 per cent of the cases treated in 1954. The reason given for the suspension in 40 to 50 per cent of the cases was a lacerated pelvic supporting structure. In most instances a corrective operation for the lacerated structure was incorporated with the suspension. Eleven cases were reviewed by the committee and one letter was sent for an inadequate chart.

TABLE IV. NUMBER OF UTERINE SUSPENSIONS

1951	69
1952	63
1953	14
1954	12

Tubal Ligation.—The frequency with which tubal ligation was combined with other operations in this hospital is shown in Table V. Tubal ligation has been sanctioned by the staff of the hospital provided the patient and her husband sign a written authorization sheet, and consultation is obtained with one

physician other than the operating surgeon. It is not necessary that the consulting physician agree, and no additional consultation is required provided he disagrees. No consultation is required when the tubal ligation is performed as a part of reconstructive surgery. Tubal ligation was performed in 65 per cent of the cases in which a uterine suspension was done in 1952; in 50 per cent, in 1953; and in 41.6 per cent in 1954. Medical reasons were recorded in only 2 cases in 1952, asthma and diabetes. The reasons recorded in 1953 are toxemia of pregnancy, 2; economic, 2; prolonged labor, one. The reasons recorded in 1954 are economic, 3; toxemia, one; psychiatric, one; and increasing otosclerosis, one. No consultation was sought for any patient prior to 1954. Consultation was obtained in 10 of the 12 cases in 1954 that were not included as a part of reconstructive surgery. The mean age of all patients who had tubal ligations in the hospital is 28 years. The committee reviewed 33 cases. All were approved except 2 in which the physician failed to obtain a consultation or permission slip.

TABLE V. ANALYSIS OF TUBAL LIGATIONS

	AT CESAREAN SECTION	POST PARTUM	PRIMARY PROCEDURE
1952	15	0	39
1953	6	1	9
1954	9	7	21

Therapeutic Abortion.—Two therapeutic abortions have been performed in the hospital. One was in a 33-year-old hypertensive patient with a very low mentality. She had had severe toxemia with all of her five previous pregnancies. Convulsion, coma for 24 hours, cardiac failure, and hemorrhages from the gastrointestinal and respiratory tract characterized her last pregnancy. The second patient was a 38-year-old gravida iv, para iii, with a history of chronic glomerulonephritis following scarlet fever as a child. She had had severe preeclampsia with the preceding pregnancies. Adequate consultation was obtained in both cases. One of the cases was reviewed by the committee and approved. There is no record of the other having been reviewed.

Exploratory Laparotomy.—Five exploratory laparotomies have been performed that involved gynecological problems. All were done after consultation except in one patient who had an excellent recorded history and physical findings suggestive of an ectopic pregnancy. A ruptured Graafian follicle was discovered at operation. The other instances include bicornuate uterus with pregnancy, 2 cases; carcinoma of the ovary with generalized carcinomatosis, one; and acute pelvic inflammatory disease, one. The tissue committee reviewed the 2 cases of bicornuate uterus and pregnancy. The other cases were not reviewed.

Other Cases.—The committee reviewed the following cases and approved them:

1. Resection of a corpus luteum which had been diagnosed as endometriosis.
2. Dilatation and curettage done on an early unsuspected pregnancy. This was justified by the history, physical, and laboratory findings.
3. Laparotomy and dilatation and curettage for a suspected ectopic pregnancy with a pathological report of decidua of cervix.

A case of removal of a para ovarian cyst was rejected because the record contained no description of the operation. Two versions were done. A ruptured uterus resulted in both cases and required a hysterectomy. These cases were not reviewed.

Conclusions

The scope of the tissue committee is too limited when it serves as the only body providing restraint in a small hospital. At times, the staff can make the work of the committee valueless through its own rulings. These are the two great weaknesses of this committee.

The tissue committee does seem to appeal to the moral and ethical integrity of the physician. He has become more diligent in the performance of work that will be considered good by his colleagues. This, I believe, is the greatest contribution of a tissue committee to the hospital staff. It has been demonstrated by an improvement in the charts, better selection of the type of operation performed, the reduction of unnecessary operations, and the more frequent use of consultation.

Discussion

DR. WALTER T. DANNREUTHER, New York, N. Y.—To an older practitioner, this presentation stimulates thoughts which are perhaps more philosophical than directly pertinent to the context of the paper. However, Dr. Moore's statistics demonstrate the extent to which self-discipline can elevate the character of the work done by the staff of a comparatively new hospital. He and his colleagues are to be congratulated and commended for the remarkable improvement in surgical judgment and reduction in the number of questionable operations in a short space of time, as exemplified by his figures. It is quite evident that his group has come to appreciate that while hysterectomy may be the easiest it is not always the best way to control uterine symptoms, that total extirpation of the uterus is preferable to the supravaginal technique, that uterine suspension is often a superfluous operation, and that cesarean sections should be subject to definite restrictions. It seems logical also to place certain additional controls on tubal ligations for sterilization, and perhaps this will be the next achievement of the Tissue Committee. Another important responsibility of a tissue committee is to correlate the record of the preoperative diagnosis, operating room diagnosis, and the pathological report on tissue removed and then to review all the circumstances dispassionately. This cannot be interpreted correctly except by a committee of staff members, and, so far as I am concerned, the criticism by an individual of the records from a group of hospitals is worthless and unjustifiably reflects discredit upon an honorable profession. For example, we have recently heard a great deal about the "hysterectomy racket," not only in medical literature but also in the lay press. A uterus reaching the laboratory may have been removed because of procidentia, or because of hemorrhage that did not cease after organotherapy and curettage, or because of an extensively diseased cervix in a woman over 45, or because of intense dysmenorrhea which failed to yield to medication or sympathectomy in a multiparous patient, or as a sterilization procedure after several cesarean sections, and still show no evidence of fundal pathology; yet this group of cases constitutes no part of the "hysterectomy racket."

Every young man upon entering the practice of medicine, particularly in a surgical specialty, after completing his residency training is doubtless imbued with the highest professional ideals, and is entirely unaware of the danger and difficulties that may beset his path. His clinical opportunities may be limited by the selfishness of senior men, his intellectual honesty may be taxed by the temptation to do unnecessary operations or to make excursions into other fields of practice by unusually affluent patients, and his moral fiber may be jeopardized by the lure of split fees. I have been teaching graduate students and training residents for more than forty years and have always considered it to be as much my business to inculcate a proper conception of the ethics of practice as to train them in technical details. If the young men on a hospital staff will be content to practice with a clear conscience, putting the patient's welfare above all else, accepting just criticism, and seeking consultation when necessary, and if the older men will generously encourage and help them by precept and example, the entire staff will function harmoniously at maximum efficiency. The conscientious doctor will do the best he can at all times regardless of censure or applause.

I well remember the organization meeting of this Society in Charlotte eighteen years ago, when I became your first honorary member and when Dr. Oren Moore paid me the compliment of asking my advice in drafting your Constitution and By-laws. It may surprise some of you to know that I strongly advised against providing for Board Certification as a requirement for membership at that time. As I envisioned the immediate objectives, it seemed likely that the Society could exert a much more constructive influence by welcoming the younger obstetricians and gynecologists and providing a scientific forum in which they could actively participate, than by limiting its membership to Board Diplomates. There is no doubt that your subsequent meetings have been a magnet for the men in this area to such an extent that they have been encouraged to read and to write and to travel more extensively, as a result of which the caliber of practice has improved tremendously.

How successful your Society has been in accomplishing its primary purpose is attested by the full attendance at your meetings, and the lure that they now have for your several honorary members, to say nothing of your expanded membership and long waiting list.

DR. DONALD C. SCHWEIZER, Greensboro, N. C.—I was especially interested in this paper because the situation in Greenwood, South Carolina, appears to have some close parallels to that in our community of Greensboro, North Carolina. The improvements in gynecological surgery, consultations, and records especially that were noted since establishment of this tissue committee have been considerable and from our experience I feel that Dr. Moore is justified in crediting the tissue committee with this result. Another factor which could have contributed to this change, however, was the influx which Dr. Moore mentioned of several more recently trained physicians into Greenwood.

By way of comparison, I would briefly mention some of our experiences in North Carolina. Here too, we recently opened a new hospital in 1953 and established the first tissue committee which began functioning in January, 1954. In two years of operation the most striking change has been the number of cases brought up for review. Using about the same criteria as the Self Memorial Hospital group, we found that the proportion of cases was cut approximately in half in 1955 as compared to 1954. We reviewed slightly over 6 cases per 100 operations in 1954 and a little over 3 cases per 100 in 1955. The section rate has remained constant at 3.1 per cent. The improvement in consultations was not as marked as in the South Carolina group but the other figures are comparable.

Our biggest problem was records. I am sorry to say that we did not see the improvement that they saw in Greenwood. Some of our questioned cases were so classified because of inadequate records, not incomplete from a record room point of view but incomplete as far as clarity and pertinence were concerned. So far we have referred the problem to the record committee, feeling that this problem is not entirely within the province of a tissue committee.

It is our opinion that the greatest value of a tissue committee lies simply in its very existence. The fact that each surgeon is aware that his case may be subject to review by his colleagues acts as a gentle but effective restraint. By the same token when a physician has a case which he feels could become controversial he is much more apt to seek consultation. Naturally a tissue committee is valueless without the cooperation of the medical staff and I agree with Dr. Moore that a tissue committee cannot act as the only restraint or control in a hospital. The tissue committee will make a surgeon more cautious but it cannot change him. It cannot substantially improve the quality of history writing and it cannot satisfactorily supervise nonsurgical cases. These items more properly could come under the function of a medical audit.

Although considerable improvement has been demonstrated following establishment of tissue committees certainly there is room for continuous improvement with benefit to the patient, the hospital, and the medical staff.

DR. LAWRENCE L. HESTER, JR. (read by DR. ARTHUR L. RIVERS), Charleston, S. C.—Dr. Moore has presented statistical evidence that following the formation of a tissue committee there was a decrease from 7.3 to 4.8 per cent in the number of cesarean sections performed. There was, likewise, a decrease in the number of gynecological operations performed, particularly uterine suspensions. More important, though, was the increase in obstetrical and gynecological consultations and the improvement in the hospital records.

Now why did this change occur? There was another factor present that is more difficult to evaluate. This other factor is the establishment of practice in Greenwood of other physicians, certified or board eligible, particularly in obstetrics and gynecology. The presence of a trained obstetrician and gynecologist on the staff of a hospital is a deterrent to unnecessary and incomplete pelvic surgery. Both of the above factors are important and necessary; however, perhaps Dr. Moore is giving too much credit to the tissue committee, and not enough to the well-trained obstetricians and gynecologists who have located in the less populous areas.

In evaluating the work of a tissue committee it is difficult to state its function and purpose. Is its purpose to review all operative cases, or certain select cases? Should the type of operations performed, the organs removed, etc., be scrutinized, or should the tissue committee try to answer the question, "Was this operation indicated?"

If all operative cases are not scrutinized, and ideally all should be, then operations that fall into the following categories should be reviewed: (1) operations involving the reproductive organs; (2) appendectomies; (3) cases in which pathologists reported no or minimal pathological changes; (4) cases in which the preoperative and postoperative diagnoses could not be correlated. (5) emergency operations; (6) operative cases in which no tissue was removed, as in lysis of adhesions, uterine suspensions, and cases in which incisions were closed without consummation of definitive surgery. (7) Certain specialties should be spot checked at intervals if they are not routinely reviewed or included in the previous categories.

The scope of a tissue committee is unlimited for it evaluates all surgery done by the staff and rates the competence of each surgeon. If its scope is too limited, then the hospital staff or the committee itself is at fault.

Last, consultation that agree should always be on a patient's chart before tubal ligation for the protection of the physician as well as the patient. The socioeconomic factor as a reason for sterilization is questioned by many.

DR. WILLIAM V. SKILES, JR., Atlanta, Ga.—I had the good fortune to be in on the incipiency of a tissue committee, which started some 3½ years ago, and I think there are one or two points that might be brought out.

First, it should be a committee which has a rotating membership, so that eventually all members of the staff will participate in it, because in the sessions of that committee, in studying these charts yourself, and in going over them with the other members of the committee, you can learn a great deal which will be of inestimable value to you. I think it is a teaching program, as well as a policeman, if you can call it that, on the acts of other physicians. It helps you and naturally it helps your patients, which, in the final analysis, is the help you wish to have.

One other thing, the ones who have the worst charts and the ones who do the most unnecessary surgery should always be put on the committee, because, as they see these charts being evaluated, even some of their own charts, they begin to see how they have made errors. In this case, several men, who have had the worst charts, now have the best and have the least unnecessary surgery. I think this is quite important.

Another thing that impressed me was the psychological difference, maybe it is philosophical, between the surgeon and the obstetrician and gynecologist. The obstetrician and gynecologist—and I want to beg your pardon if there are any general surgeons here—the obstetrician and gynecologist usually tries to diagnose the case before he does the laparotomy. The general surgeon says, "Let's open them up and then see." I was very forcefully impressed with that.

DR. FRANKLIN L. PAYNE, Philadelphia, Pa.—This subject is extremely important in our specialty. Several statements in the essay and in the discussion deserve emphasis. Dr. Moore pointed out certain inherent limitations in any tissue committee and Dr. Rivers stated that, in addition to a tissue committee, they now have an abortion and sterilization committee. The tissue committee of any hospital performs a highly important function, but it does not appear that review of therapeutic abortions and tubal ligations for the purpose of sterilization should be included in this function. This committee makes its decisions following operation and the decision as to the justification for abortion and sterilization should be made

prior to the proposed procedure. Furthermore, the composition of the usual tissue committee is such that it is not likely that each member is fully equipped to exercise the clinical judgment that is required of an abortion and sterilization committee. The problems of the latter are those of obstetrics and gynecology along with the other fields of clinical medicine. If our specialty is to maintain its position alongside internal medicine and surgery as a third major specialty, we should, within our family, set up our professional standards and abide by them. There is no other problem to which this concept is more applicable than that of the justification of therapeutic abortion or sterilization.

Recently, our Department submitted to the Medical Board of the Hospital of the University of Pennsylvania a set of rules governing the organization and functioning of the abortion and sterilization committee. These rules are modeled after those about which Dr. H. A. Pearse of Detroit has written. After considerable alteration that followed consultation with the legal advisers of our hospital, these rules were approved and they now govern our procedure in the consideration of each such problem. A new committee is appointed for each problem, to consist of three qualified obstetrician-gynecologists, except when the principal indication for the abortion or sterilization falls within the realm of some other specialty. Under this circumstance the third member of the committee is chosen by the chairman of the department of the appropriate specialty, to serve for consideration of that particular case. The committee functions without fee and its decision is final regardless of opinions that may have been expressed by preceding consultants. This decision is forwarded in writing to the Chairman of the Department of Obstetrics and Gynecology and it in turn is forwarded in writing to the physician in charge of the patient.

The decisions of such committees will, of necessity, be governed by two considerations; professional knowledge and standards and the local legal statutes. In Pennsylvania, since no laws exist concerning sterilization, it is the prerogative and the duty of our specialty to establish standards as to the indications for this procedure. On the other hand, *unlawful* abortion is defined by statute. Concerning *lawful abortion* our legal adviser states: "Where such an abortion was done in the honest belief that it was necessary in order to save the life of the woman, it was not a violation of the statute. There would appear to be a question, however, as to whether it was proper to perform such an operation in order to prevent detriment to the health of the patient. We could not advise you that mere impairment of health will justify the operation, unless such impairment was so serious as to endanger the woman's life." So, in the matter of therapeutic abortion, with the legal interpretation in mind, we return to the first consideration, that of professional knowledge and standards. With each such problem members of our specialty, with qualified consultant aid, must decide whether the pregnancy endangers the life of the patient sufficiently to indicate its therapeutic termination.

DR. MOORE (Closing).—I would like to state briefly that the membership of our committee is composed of the chiefs of the Departments of Obstetrics and Gynecology, Surgery, Medicine, Pathology, and one additional member appointed from the staff. Thus the membership of the committee tends to rotate each year, as these officers are elected by the staff.

In answer to the question about the records, I found that some of our Board members wrote up some of the poorest charts, so I am afraid I can't say the other physicians are entirely at fault.

In answer to Dr. Hester and Dr. Rivers' question, I did not include in this report any of the appendectomies that were reviewed, as I tried to limit this report strictly to cases in the Department of Obstetrics and Gynecology.

PREGNANCY IN THE BICORNUATE UTERUS*

FREDERICK H. FALLS, M.D., RIVER FOREST, ILL.

PREGNANCY has been occurring in bicornuate uteri since prehistoric times. Very little attention has been paid to this complication until recent years. Bumm's textbook of obstetrics which, until the beginning of this century, was considered as the leading textbook in the civilized world, dismissed the subject with the comment, "Labor in this type of a uterus is apt to be complicated." Williams devoted less than one page to his discussion of the subject and DeLee, in his third edition—1920, does not even mention pregnancy in the bicornuate uterus. Stander, in his ninth edition of Williams' *Obstetrics,* devoted a page to rather diagrammatic drawings and quoted briefly some of my early work on this subject.

As I have continued over the years making observations on this subject, I have become more and more impressed by the large number of obstetrical complications which occur because of the fundamental defects in the embryological formation of these uteri.

Since many of these complications can be anticipated and, therefore, better handled, it seems desirable to present some of these data for your consideration. I believe the matter which I will present would not be considered common knowledge.

For a number of years we have been interested in the combination of pregnancy and the bicornuate uterus. Our first introduction to the subject was in 1921 when a baby died in utero after two hours of desultory labor which continued, after its death, until a Voorhees bag was introduced through the cervix. Good pains were stimulated, the cervix dilated; the bag was expelled and yet the head did not engage. After a few hours, a hand, introduced into the uterus, was found not to be in contact with the fetus. A septate uterus was diagnosed, the septum perforated and the baby delivered by version and extraction. Two years subsequently at cesarean section performed by DeLee, the septum was exposed and the hole which I had made was demonstrated.

Since this experience I have become more and more interested in the subject and have collected a number of observations which I should like to share with you.

We may start with the fundamental proposition that all uteri in the early stages of their development are bicornuate. The normal, roughly pear-shaped human uterus is the product of a fusion of the Müllerian ducts. If this fusion fails to occur, due to various circumstances about which we can

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only guess, a deformity of the uterus results and is of greater or less degree, depending on the time in the life of the embryo when interference occurred in the orderly process of uterine development.

If very early in embryonic life the lack of fusion may result in two complete uteri each with an associated vagina (uterus didelphys). If the cervices fuse but not the body, we have the uterus bicornis unicollis. If the cervices and the bodies fuse but a septum remains between the right and left sides, we have a uterus bicornis septus. If the dividing septum is present in the upper part of the uterus only, a subseptus organ is formed. If there is only a slight notch in the fundus to indicate lack of fusion, the arcuate type of bicornuate uterus should be diagnosed.

Obviously the type and degree of deformity will alter the development and expulsion of any embryo which is conceived and develops in this type of uterus. It is not logical to suppose that the circulation, musculature, and innervation would be normal in this type of uterus. This being the case, one would hardly expect a normal decidual reaction and normal nidation. Under these circumstances the development of the early placenta should be abnormal and possibly result in more frequent abortions or premature labors.

In order to evaluate the effect of the deformity on the pregnant state, it is necessary to study the course of pregnancy in women with varying degrees of the deformity. It is axiomatic that the more marked the uterine deformity, the fewer examples will be met clinically and the greater the difficulties one may expect during pregnancy and parturition; also the easier it is to make an early diagnosis and hence give these patients the benefit of early treatment. Contrariwise, the lesser degrees of deformity are difficult or impossible to diagnose in the early stages of pregnancy or even close to term, unless very careful examinations are made before, during, and after labor.

Time will not permit an elaborate presentation of the embryological data on which these observations are founded. Suffice it to say that the Müllerian ducts arise from the Wolffian body, approach the midline, and fuse in their lower portions to form the upper portion of the vagina, cervix, and uterus and their upper ends form the tubes.

From the study of comparative anatomy it will be seen that the opossum uterus simulates the uterus didelphys; the dog's uterus is like the uterus bicornis unicollis and the mare's uterus simulates the arcuate type of bicornuate uterus.

Realizing that our chief interest in this subject is essentially clinical, I would like to call to your attention important obstetrical complications which have occurred in my experience which seem to be due in whole or in part to this deformity.

Sterility.—When a patient presents herself with a history of absolute sterility or with the story that she has been able to get pregnant, but habitually aborts at the third to the fifth month, we have a strong suspicion that, among various potential causes, the possibility of a bicornuate uterus being responsible must have serious consideration.

The diagnosis is relatively easily made in the more marked cases if there is a septate vagina, two cervices, or a single vagina and cervix with duplex body. The difficulty arises when minor degrees of deformity exist such as the uterus septus, subseptus, and arcuatus. The most practical way to study these cases is with a uterine probe which can be introduced through the cervix as an office procedure without anesthesia. The most practical instrument I have found is a very flexible silver probe with a bulbous tip mounted on a small handle. This can be introduced into the fundus with its distal centimeter slightly curved. When stopped by the fundus, if rotated slightly, the tip will project an additional centimeter or two into the cavity of the horn. Withdrawing and again locating the depth of the fundus, rotating the sound in the opposite direction, it will be found that the probe enters the opposite horn in the same manner.

The impression thus obtained can be verified by doing a dilatation and curettage and exploring the shape of the endometrial cavity with a curette or No. 6 Hegar dilator. Also one may take a uterogram after filling the endometrial cavity with Lipiodol which will show the central dip in the fundus. If a septum is present, the lateral deviation of the probe is usually more marked and, in withdrawing from one horn, the probe must approach the external os before it passes the lower end of the septum and can be inserted into the other horn.

After such a uterus becomes pregnant, a series of changes takes place which are quite elusive unless looked for specifically, and are quite characteristic when found. Almost invariably the pregnant side of such a uterus will increase in size faster than the other side. With this a softening of the pregnant horn occurs and, as a result, the firmer nonpregnant horn is often considered to be a fibromyoma. Later on it also softens and can no longer be distinguished from the rest of the uterine muscle by its consistency.

As the uterus enters the abdomen and approaches the umbilicus, it will be noted that it is broader than the usual uterus and a notch will be felt in the fundus, dividing it into two unequal divisions. Frequently, also, it will be found that the uterus deviates to one or the other side of the abdomen and may rotate somewhat on its longitudinal axis.

Abortion.—Abortion is much more common in these uteri in our experience than it is in normal uteri. The cause of these abortions is not known. The patient who seems to be normally pregnant suddenly begins to "spot" without any history of physical or emotional shock or trauma. The spotting is followed by more bleeding, accompanied by cramps. The uterus empties itself completely or incompletely. In the latter case serious postpartum hemorrhage may be encountered and in these cases, on digital or instrumental exploration of the uterine cavity, an incompletely detached placenta will be found usually adherent in one horn of the uterus. Exploration of the uterine cavity after removal of the placenta shows the bicornuate nature of the uterine deformity. The expelled fetus may be quite normal in appearance or it may show evidence of deformity. The placenta may not differ greatly from those found in

abortions occurring in women with normal uteri. However, careful examination of the placenta in pregnancies that have advanced to the fourth or fifth month reveals characteristic differences. As a rule, they are thinner and frequently are either bipartite or roughly heart shaped. The factor causing the abortion seems to be an undue irritability of the uterus. The resulting contractions lead to partial or complete separation of the placenta and death and expulsion of the product of conception. We have been able to prevent these abortions in 80 per cent of these cases by giving corpus lutein injections (lutein solution) in 3 c.c. doses twice a week. It seems logical to assume that these factors might be seriously considered as having a bearing on this problem.

If we admit that the musculature of the uterine wall is defective because of its embryological maldevelopment, it seems to follow that the circulation and innervation would also be abnormal. Under these circumstances a perfectly normal decidual reaction would hardly be expected. An abnormal decidua leads to defective nidation, placentation, and adversely affects normal development of the embryo and hence promotes fetal deaths and expulsion. These factors are difficult to prove, but they are equally impossible to deny.

Premature Labor.—Closely related to the subject of abortion in patients with this type of uterine abnormality is that of premature labor. If these patients are observed carefully, it will be found that the uterus is abnormally irritable and that the Braxton Hicks contractions are more frequent and more powerful. We have observed this tendency most often in patients whom we have had under treatment for habitual abortion and who may have to be hospitalized in order to receive sufficient corpus lutein extract, intravenously if necessary, to prevent the onset of premature labor. Occasionally as much as 12 c.c. has been given to quiet contractions, followed by 3 c.c. doses intramuscularly every four hours. The patients are kept at bed rest and the dosage gradually decreased until the abnormal irritability has been controlled by one 3 c.c. injection daily for two or three days, or until recurrence of the contractions makes return to the larger and more frequent dosage advisable.

Intrauterine Fetal Asphyxia.—About the sixth month it will be noted that the heart tones that have been observed for several weeks are clear but display a peculiar irregularity that is practically impossible to explain by any discernible change in the local conditions. While the heart tones are counted for a minute, several different rates may be observed for a few seconds varying from 120 to 160 for no apparent cause. Our interpretation of this phenomenon is that abnormalities in placentation, uterine circulation, and possibly in innervation affect unfavorably the oxygen supply to the fetus, keeping it constantly on the verge of hypoxia. This condition may become so acute and severe in some cases that intrauterine fetal death results near term for no other valid reason.

Breech Presentation.—We have found that breech presentation is considerably more common in this type of uterine deformity. The breech may be

a primary presentation or may be secondary to a transverse presentation which develops into a breech after the uterine contractions have dilated the cervix and the membranes have ruptured.

In arcuate bicornuate uteri a breech presentation is frequently obliquely transverse and, for this reason, it does not fill the inlet of the pelvis as fully as cephalic presentations and predisposes to prolapse of the umbilical cord. This complication is the more dangerous because of the tendency to fetal anoxia mentioned above.

For this reason the heart tones should be particularly carefully evaluated during labor, and especially immediately after rupture of the membranes. Oxygen should be administered to the mother and preparations for rapid delivery should be made as soon as the heart tones indicate severe fetal anoxemia.

Fetal Malposition.—One of the most important factors in making a diagnosis of the uterine anomaly is that the fetus may occupy an abnormal position in utero. In a certain percentage of these cases careful examination, after the sixth month, will disclose a transverse, or what is much more common, obliquely transverse, position.

Obliquely transverse position: We will note that one pole of the fetus will be found in one iliac fossa and the opposite pole will be found at the rib margin of the opposite side. Not infrequently near term attempts at conversion by external version will be found to be difficult or impossible. Furthermore, engagement of the fetal head is apt to be late or may not occur, necessitating a breech extraction or a version and extraction, depending on whether one is dealing with an oblique breech presentation or cephalic presentation. If the pregnancy is in a septate or subseptate type of bicornuate uterus, external version is usually impossible. We believe that, when the fetus is found to occupy this position, in primiparas at least, some degree of bicornuate uterus is present in all cases.

Transverse presentation: This is not so common as the oblique transverse presentation and is more often seen in multiparas. In such cases we have found that conversion from a transverse to a longitudinal presentation by external version is difficult as a rule, or impossible, and that even when accomplished the fetus rarely stays in the new position. For these reasons, we advise against this maneuver unless conversion of the fetus to a longitudinal position can be very easily accomplished.

Transverse presentations increase the hazard to the fetus for various reasons: First, because there is a tendency to prematurity because of premature rupture of the membranes; second, because prolapsed cord is more common; and third, because delivery must be undertaken in some cases after long desultory labor and severe intrauterine fetal anoxia. For these reasons, if the heart tones are not of good quality and if labor pains are not of sufficient quality to dilate the cervix promptly, cesarean section may be undertaken to effect a delivery, particularly in those where there may be some cephalopelvic disproportion, in elderly primiparas, or in women who have lost several pregnancies through abortion.

It is not uncommon in some of these cases to have a prolapse of the arm with or without prolapse of the cord. Under these circumstances, a fillet should be promptly placed on the wrist, the patient deeply anesthetized, the shoulder disengaged, and a combined version performed. During all of these maneuvers a high concentration of oxygen in the maternal blood should be sought to reduce the hazard of intrauterine fetal asphyxia.

Face and brow presentation: Less well documented in our experience is the relationship between face and brow to this type of uterine deformity. It will be well, however, to consider the possibility of this connection when these types of malpositions are encountered, for the reason that, if present, special precautions should be taken to reduce intrauterine fetal anoxemia and because it may be necessary to depend on forceps delivery due to an inherent primary uterine inertia which in turn depends on the abnormal development of the uterine muscle.

Opisthotonos fetus: In 1916 I described a peculiar attitude of the fetus in utero called opisthotonos fetus. In this condition the head and body of the child are in complete extension instead of the usual flexion. Conversion before labor in most cases is impossible. The fetus must be delivered by version and extraction as soon as the cervix is dilated, or by cesarean section if the cord prolapses when the membranes rupture. Since my first observations, I have seen several examples of this condition, in some of which dead babies were delivered. Unfortunately the connection between the malposition and the developmental anomaly did not impress me at the time I saw these cases, except in a recent case of breech presentation with the head in extension in which the deformity of the uterus was easily demonstrated before and after delivery of the baby. The placenta was typically bipartite.

Placenta Previa.—The etiology of placenta previa is obscure and for this reason all theories which have a reasonable possibility of explaining some of these cases should be accepted and explored for what they are worth.

The fertilized ovum, having undergone cell division to produce a morula, enters the uterus and by the erosive action of the outer layer of trophoblastic cells on its periphery invades the decidua-like secretory endometrium and burrows into this membrane, thus completing nidation. The factors influencing the attraction of the morula to the endometrium are not known. We can safely assume that a well-developed and well-nourished endometrium would be more favorable for this process than an endometrium not so favored. We may also assume that, if the musculature in these uteri and their dynamic activity are abnormal physiologically, the endometrium might also reflect this fundamental maldevelopment. We might, therefore, expect the morula to take longer to implant and the point of nidation to be closer to the internal os. At any rate we have noted a number of cases of low-lying placenta and placenta previa in patients with this type of uterus. It may easily be, although practically impossible to prove, that many of the early abortions occurring in these cases are the result of unfavorable low implantation of the ovum.

Premature Detachment of the Placenta.—This complication, in our experience, occurs more frequently in women with bicornuate uteri than in those

with normal uteri. Again the cause is obscure. A hemorrhage occurs in the decidua spongiosa in the center or the periphery of the placenta. Although nobody knows exactly why these placental decidual hemorrhages occur, an abnormal decidua and an abnormal circulation in a deformed uterus might well explain at least some cases. This complication is frequently associated with a mild eclamptogenic toxemia which is dangerous in itself to the fetus. If we add a primary circulatory abnormality and a defective uterine musculature, the hazard to the fetus is obvious.

Eclamptogenic Toxemia.—Eclamptogenic toxemia must be put in the same category as ablatio placentae. As a matter of fact, we feel that they are both part of the same process. In eclampsia the hemorrhage into the placenta is at the level of the decidua compacta, and in premature detachment it occurs in the decidua spongiosa. We have been impressed by the number of these cases encountered in this study. Because of these facts we find ourselves inclined to deliver these babies by cesarean section under local anesthesia, feeling that this type of delivery is much safer.

Prolapsed Cord.—Many factors surrounding the birth of a baby whose mother has a bicornuate uterus predispose to prolapse of the umbilical cord. Among these are prematurity, transverse or oblique presentation, low-lying placenta, and bag induction of labor or bag stimulation of desultory labor pains; prevention of early rupture of the membranes by gentle examination of the dilating cervix and detection, if possible, between pains of whether or not there is a forelying cord. Ironing out of the perineum and local anesthetic infiltration, especially in oblique and transverse presentations, are indicated to facilitate rapid version and extraction if prolapse occurs. With the approach of the end of the first stage of labor, the patient should be set up for delivery and the heart tones carefully evaluated every five minutes or more frequently if necessary. They should be counted immediately after rupture of the membranes and a sterile vaginal examination performed to determine whether or not a prolapse of the cord has occurred or is imminent. If the cervix is completely dilated, and if the fetus is of normal size, and if there is no evidence of cephalopelvic disproportion, a version and extraction is indicated unless the head or breech engages immediately and begins rapid descent with the next few pains. If this does not happen, due to disproportion, and if the heart tones are not of good quality, cesarean section is indicated.

Inversion of the Uterus.—Inversion of the uterus is fortunately a very rare complication in a well-conducted obstetrical service. When one occurs, the desperate condition of shock developing so rapidly in such patients stimulates action to relieve the condition without too much speculation about why it occurred unless inexcusable traction on the cord obviously caused the condition. However, careful examination of the walls of these uteri before and after delivery and especially at cesarean section reveals that they are extremely thin. It would be easy to surmise that, with a retained placenta adherent in one horn of the uterus, injudicious traction on the cord or Credé expression

might easily lead to this accident. Furthermore, a thinned-out uterine musculature might even turn itself inside out trying to deliver the placenta. We have occasionally seen this occur in nonpregnant fibroid uteri.

Postpartum Hemorrhage.—During labor, if the patient has a bicornuate uterus, it is well to be prepared for a possible postpartum hemorrhage. The incidence of this complication is definitely more common than in the patient with a normal uterus and for the following reasons. The uterine contractions are frequently not so powerful and, therefore, do not compress the arterioles within the uterine wall as thoroughly. This may be partly due to a thinner uterine musculature and partly to faulty innervation of the uterus which may well be an important factor in its relaxation. Prolonged desultory labor also may so exhaust the musculature of the uterine wall that relaxation may be acute after delivery and difficult to counteract. Oxytocics and massage and massage and uterine packing should be resorted to without delay and before there has been much blood loss. Blood should be available and the patient typed and cross-matched before the threat of hemorrhages arrives.

Retained Placenta.—Poor uterine contractions fail to provide the normal shearing action in the third stage. Frequently the placenta is elongated or heart shaped and one side will become separated while the other half is retained, which results in postpartum hemorrhage until the adherent portion is freed and the placenta can be delivered manually. One should, therefore, not hesitate to invade the uterine cavity and remove pieces of placental tissue or an adherent placenta attached to one or both horns of the uterus before the patient has lost too much blood. Packing may have to be resorted to especially in localities and institutions where blood banks and transfusion facilities are difficult to procure.

Septate Vagina.—The septate vagina rarely gives rise to complications until the onset of labor. It is usually associated with uterus didelphys and in most cases the vagina attached to the pregnant horn dilates sufficiently to allow the passage of the head without rupturing the septum.

In some cases, however, the septum is torn by the head or so obstructs descent that it is necessary to cut it to allow the head to be born. In other instances dyspareunia makes it advisable to remove this septum. This can be simply done by placing clamps on the septum from the introitus to the cervix and close to the anterior and posterior vaginal walls and removing the intervening tissue by cautery.

Septate Uterus.—In patients who have had a history of repeated abortion and in whom a septum can be demonstrated, a hysterotomy is advisable with removal of the septum surgically, thus providing a single uterine cavity which will be better adapted for the retention of a developing embryo.

Didelphys Uterus.—When pregnancy occurs in the uterus didelphys, lateral displacement of the pregnant horn is more obvious than in the milder degrees of bicornuate uterus. The older authors mention the hypertrophy of the nonpregnant horn and stress its interference with engagement and delivery of the fetus. I have not been impressed by this complication in

the few cases of this kind which I have seen. Some of these have delivered spontaneously, others had desultory labor which necessitated cesarean section but not apparently on the basis of obstruction by the hypertrophied nonpregnant horn.

Our practice, therefore, in these cases is to allow the patient to go into labor anticipating engagement and normal delivery. If this does not occur in a reasonable length of time, and particularly if evidence of intrauterine fetal anoxemia develops at any time, cesarean section is elected as the safest method of delivery. It is possible to have a twin pregnancy delivered with one fetus in each horn.

Dr. Palmer Findley of Omaha, Nebraska, demonstrated a photograph of a didelphys uterus, each horn removed from the abdomen at cesarean section unopened. He then performed a cesarean section on each horn in succession. I delivered a twin pregnancy from one horn of a uterus didelphys, having made the diagnosis preoperatively by roentgenography by injecting Lipiodol into the nonpregnant horn a few weeks before the operation.

Comment

It will, therefore, be seen that when pregnancy occurs in the bicornuate uterus, various complications may occur and should be anticipated. In spite of this, it cannot be emphasized too strongly that a large percentage of these patients are delivered spontaneously and without complications. It is this fact, I am sure, which has led to a failure to appraise the importance of the deformity in the management of pregnancy and labor.

After studying the condition for thirty-five years, I have felt that the old obstetrical expression, "watchful expectancy," fits this condition perfectly. To be alerted regarding these possible complications is to rob them of much of their potential danger; to disregard the warning provided by careful diagnosis of such deformity before or during pregnancy is unjustifiable.

Conclusions

1. All uteri at some stage of their development are bicornuate.

2. One or both horns may fail to develop normally.

3. The horns may develop normally but have failure of fusion in varying degrees producing a series of anomalies with the uterus didelphys at one end and the uterus arcuatus at the other.

4. The frequency of their clinical appearance varies directly as they approach the uterus arcuatus.

5. A disproportionate number of complications of pregnancy and labor are noted when the pregnancy occurs in the bicornuate uterus.

6. Heretofore, such a complication as transverse presentation, desultory labor, postpartum hemorrhage, prolapsed cord, and retained placenta has been accepted as a diagnosis at the end of a complicated delivery. The real diagnosis, bicornuate uterus, has been unsuspected or ignored.

7. The anomaly is one of the most important causes of perinatal mortality and a proper appreciation of this will result in very significant fetal salvage.

8. A great step forward will have been taken when the medical profession, both general practitioners and specialists, appreciates the frequency of the milder forms of this deformity and prepares by their early recognition, to minimize the dangers of the inevitable complications of gestation.

Discussion

DR. FRANK R. LOCK, Winston-Salem, N. C.—Dr. Falls has drawn upon the enormous experience in obstetrical pathology which has been available to him in Cooke County Hospital and other obstetrical services in Chicago in presenting to us this material on pregnancy in the bicornuate uterus. He has made a careful analysis of his clinical impression of the numerous obstetrical complications which he believes may relate to this combination of circumstances. He has called to our attention the fact that a large percentage of these deliveries are spontaneous and without complications. He is concerned, however, with the frequency with which major obstetric complications develop. A statistical analysis of all pregnancies in which a failure of complete longitudinal fusion of the uterus was present was not made, and it is impossible to arrive at any specific conclusion about the actual incidence of the complications which are outlined in the presenec of a bicornuate uterus.

North Carolina is designated the Tarheel State because of the relatively constant population with little tendency toward migration of the native population to other areas. This results in long lines of genetic continuity and is, perhaps, responsible for our unusual experience with congenital pelvic abnormalities which are relatively common.

Although I have made no attempt to analyze our complete experience with pregnancy in the bicornuate uterus, I was able to recall 10 recent patients presenting this problem who amply illustrate our experience. Seven of the 10 patients had 15 normal term pregnancies and 11 of these were delivered spontaneously. One patient had 3 cesarean sections for a severely contracted pelvis. One had complete placenta previa which required cesarean section for delivery of her third child after spontaneous normal delivery of the first two. Two of the patients had late abortions at 16 weeks before the pregnancies occurred which progressed to term. In one of these, a twin pregnancy was present with one fetus in each horn.

The other 3 patients presented problems of habitual abortion and infertility. One had 4 abortions at 16 to 19 weeks of pregnancy; one, 3 abortions from 8 to 20 weeks of pregnancy, and the third, one abortion at 12 weeks. All 3 of the patients had prolonged intervals of infertility and none of them have carried a pregnancy to viability. Strassmann's unification operations have been performed on all 3—four years, two years, and eighteen months ago with a good anatomical result in 2. An early pregnancy is now under observation in one of the latter.

It is interesting that, in 2 of the 3, asymptomatic endometriosis was found at the time of laparotomy.

We are grateful to Dr. Falls for calling to our attention a myriad of obstetrical complications which he relates to pregnancy in the bicornuate uterus. Our experience has led us to expect infertility of a high degree, and late abortion to occur commonly. The other complications of pregnancy have occurred in the same order of frequency with which they occur in normal individuals. Our most common experience has been for pregnancy to progress satisfactorily to term and for a normal spontaneous delivery to occur. I quite agree with Dr. Falls' concept that extreme watchfulness should be maintained in this group of patients.

DR. JOHN B. CROSS, Atlanta, Ga.—For the past several years a great deal of time and discussion by many in the field of obstetrics has been given to the problem of perinatal mortality and high fetal wastage. Therefore, I think it is timely that a topic which seems to be so vitally associated should be presented in such a practical and informative manner. Dr. Falls, by his continued interest and observation over a period of thirty-five years, is qualified to offer a comprehensive review with some concrete data and logical conclusions on the problem of women with malformed uteri who become pregnant. He reviews the

embryology of the developing uterus and calls attention to the parallelism between uterine anomalies in the human and the similar forms which are normal for the lower animals. The malformations are classified according to the type of deformity and emphasis is given to the effect of each on the functioning uterus. A correlation between the type of obstetrical complication and the degree of the anomaly has been observed in many cases. Dr. Falls stresses early recognition of the abnormality and offers some very important signs and findings which should enable one to suspect strongly or diagnose accurately a malformed uterus. His discussion of the various complications associated with pregnancy in the bicornuate uterus and the suggestions concerning their management deserve emphasis.

A review of the records of 16 patients with pregnancy in a bicornuate uterus seen in Atlanta, Georgia, certainly confirms Dr. Bumm's comment on the subject, "Labor in this type of uterus is apt to be complicated." Records of these patients, many from the files of my colleagues, were reviewed. There was a total of 46 pregnancies with 18 term babies, 9 premature, 15 abortions, 4 stillbirths—with a total salvage of 23 babies. Other obstetrical complications of interest were: breech presentations in 10, a prolapse of the cord in one, and 2 babies were delivered by cesarean section. Two women had antepartum bleeding and 2 had retained placenta. Excessive bleeding in the third stage occurred in 3 patients. Anomalies of the urinary tract were diagnosed in 2 of the women, a congenital absence of the right kidney in one and bilateral ectopic kidneys in another. Very few of these patients had urological studies. Anomalies of the Müllerian system accompanied by abnormalities of the Wolffian apparatus have long been recognized.

Twin pregnancies, one in each horn, were proved for 2 of these women. Due to extenuating circumstances, one of the patients with a twin pregnancy decided to have her pregnancy interrupted. She consulted an abortionist who proceeded to interrupt the pregnancy. The period of gestation at the time of the interruption was approximately eight weeks. About two months following the abortion the patient was aware of a progressive increase in the size of the abdomen and with the absence of her menses for four months she decided to see the abortionist for a second time. She was again examined and, as soon as the examination was finished, the fee of $150.00 for the abortion was promptly returned and the patient advised to see her doctor, which she did. The patient was delivered approximately five months later of an 8 pound, 8 ounce female from the right horn by a low cervical cesarean section.

The other twin pregnancy resulted in the delivery of a premature infant, 5 pounds, 4 ounces, in the home by a midwife. Following the delivery the patient continued to suffer abdominal pain. Approximately one month after she was delivered of the premature infant she was transferred to a hospital. Examination at this time revealed a large mass within the abdominal cavity. An x-ray flat plate of the abdomen showed the presence of a fetus. A diagnosis was made of secondary abdominal pregnancy and a laparotomy advised. She was operated upon and a dead fetus of approximately five months' gestation was found in the rudimentary horn of a bicornuate uterus. The entire horn containing the fetus was removed. Postoperatively the patient did well and she was discharged from the hospital apparently in excellent condition.

Corrective surgery in some of these malformed uteri with recurrent complications has been recommended by Strassmann, Jones and Jones and others with encouraging results in a few cases. Strassmann offers the transverse incision through the septum with repair in the anterior-posterior direction. Jones and Jones have excised the septum, converting the uterus to one global cavity.

If we expect to lower our perinatal mortality to its minimum there must ever be an awareness of the possibility of a pregnancy in the bicornuate uterus with early recognition in many cases. Accuracy in the diagnosis of the type of genital anomaly may give a better clue to the prognosis of the patient in question. If the diagnosis is made of pregnancy in a bicornuate uterus certain preventive measures can be instituted and preparations should be made for the management of the probable complications.

DR. FRANK R. SMITH, New York, N. Y.—Starting practice in May, 1925, naturally, I had lots of time on my hands. I was single and poor! So I spent a great deal of time in the Record Room of Lying-In Hospital and I had been also stimulated by a patient of Jellinghaus who had a twin in either side of a double uterus. He collected 50 cases from the literature, mostly European, in which there had been twin pregnancies, and had that published in the Bulletin of the Lying-In Hospital.

In reviewing 140 odd thousand records in the New York Lying-In Hospital I found 35 patients with double uteri who had more than a simple bicornuate uterus. They ranged from complete uterus didelphys to unicornis and septate combinations. We had practically all combinations.

We found exactly as Dr. Falls has pointed out so graphically that there is a tendency to abortion, premature labor, and small babies, and hemorrhage is more common. In 35 cases we did 5 cesarean sections, none of these because of the uterus. They were all done because of bony pelvic disproportions. We also did not do intravenous pyelograms in all our cases. Some of them dated back around 1912 and when we began to do them we found a high incidence, as one of the discussants has mentioned, of urinary abnormalities and maldevelopments.

We did have some trouble with deliveries. I personally had trouble with 2 patients. One had a rudimentary horn developed just enough to allow the baby's entire head to jam in it, and contraction of the uterus swung the entire double uterus to the side; I finally displaced that and delivered the patient of a living baby with forceps from below. I guess I would have been smarter if I had done a cesarean, judging by the appearance of the baby. The other, the first patient who had a septate uterus, a double cervix and vaginal septum, had had three abortions too early for viability. I operated upon that patient abdominally, cut the septum out, and she went on and had one living child; she went into labor at 8 months, but she had a living child although a small baby.

SURGICAL PATHOLOGY OF SMALL OVARIAN CYSTS*

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MODIFICATION of the indications for operation for ovarian cysts, during the reproductive years of a woman's life, seems desirable because of the frequency with which certain cysts spontaneously regress and disappear. These have been classified as functional, and include follicle, corpus luteum, corpus albicans, and simple cysts. Surgery is always indicated for neoplastic cysts of the ovary regardless of the age of the patient. In order to avoid unnecessary operation for functional cysts, clinical criteria have been considered necessary before elective surgery is undertaken. These standards are: (1) any cyst over 5 cm. in diameter, (2) any cyst which increases rapidly to 5 cm. in diameter over a period of three months, and (3) any ovarian cyst in a postmenopausal patient.

All neoplastic cysts probably begin as microscopic in size and enlarge at varying rates. It is desirable to recognize these cysts as being neoplastic as early in their development as possible. For this reason a study has been made of the number of small ovarian cysts removed at Crawford W. Long Hospital in the years 1953 and 1954. It was felt that a study of this material might indicate the validity of the indications usually accepted for surgery for ovarian cysts.

It was also felt that such a study might show that enough neoplastic cysts were included to justify more liberal surgery, or that a detailed analysis of the cases of small neoplastic cysts removed might give additional signs or symptoms to indicate the advisability of early surgical intervention.

Two hundred three cases of small ovarian cysts, 5 cm. or less in diameter, were taken from hospital records of this open-staff general hospital over a two-year period, 1953-1954. The size herein discussed does not refer to the over-all size of the involved ovary but to the cyst alone. The term functional cysts is used to include follicle, corpus luteum, corpus albicans, and simple cysts. Neoplastic is the term used to designate cystic new growths found in this series. No cases of endometriosis of the ovary, in any form, are included in either group. The histologic diagnoses were made by the two pathologists at the hospital, Dr. G. D. Ayer and Dr. J. F. Olley.

For the sake of clarity the 203 cases have been divided into two basic groups: (1) premenopausal, including patients from 14 to 55 years of age, 198 cases, and (2) postmenopausal, including 5 cases of women who had had no uterine bleeding for two or more years (Table I).

The first basic group has been further divided into: (a) the cases in which ovarian cyst was the primary preoperative diagnosis, and (b) the cases where small ovarian cysts were found incidentally to other primarily diagnosed lesions. In the 33 cases in which ovarian cyst was the preoperative diagnosis, 30, or 90.9

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per cent, were functional, and 3, or 9.1 per cent, were neoplastic cysts. The neoplasms consisted of one serous cystadenoma and 2 papillary serous cystadenomas. The operations performed in this group included 9, or 27.3 per cent, resections of the ovary, 19, or 57.8 per cent, unilateral oophorectomies, one, or 3.0 per cent bilateral oophorectomy and 4 or 11.9 per cent, punctures of the cysts. The 4 cysts which were punctured were deemed to be follicle or corpus luteum cysts on gross examination at operation. Six, or 18.2 per cent, of the 33 specimens were examined by a pathologist in the operating room. One of these was a neoplastic cyst.

TABLE I. CLASSIFICATION OF OVARIAN CYSTS

	FUNCTIONAL	NEOPLASTIC	TOTAL	MALIGNANT
Premenopausal.—				
Ovarian cyst primary diagnosis	30	3	33	0
Ovarian cyst found incidentally	160	5	165	0
Postmenopausal.—				
Ovarian cyst primary diagnosis	0	0	0	0
Ovarian cyst found incidentally	0	5	5	0
Total			203	

The symptoms recorded in the cases where these small ovarian cysts were the primary indication for operation, were chronic lower abdominal pain, 18, or 54.5 per cent; dyspareunia, 4, or 11.9 per cent; menorrhagia, 3, or 9.1 per cent; sense of lower abdominal pressure, 2, or 6 per cent; backache, dysmenorrhea, irregular menses, intermenstrual spotting, and acute abdominal pain, each one, or 3 per cent. There were 7 cases, or 21.2 per cent, in which no symptoms were recorded but the patients had been told by their physicians that an ovarian cyst was present.

In Group 1a, the operations were performed by general practitioners, general surgeons, and gynecologists. Twenty-two patients were operated upon by the general practitioners, one of whom performed 6 operations while others did not more than 2 each. Three women were operated on by three general surgeons, and 8 by gynecologists, one of whom had 6 cases. It was impossible to correlate the period of time the cysts were under observation by the attending physician with the incidence of neoplastic or functional cysts because such information was not available in 12, or 36.7 per cent, of the cases.

Of the 33 ovarian cysts that were the primary reason for operation, 10, or 30.3 per cent, were estimated to be 5 cm. in diameter or larger on preoperative examination. In 12 cases, or 36.7 per cent, either no pelvic examination was on the record or the size of the cyst was not noted. In 8, or 24.3 per cent, the case record stated that no cysts or masses were felt on plevic examination, and in only 3, or 9.1 per cent, of the 33 cases did preoperative estimation of the size of the cyst coincide with the size of the cyst found at operation. The single case of "acute abdomen" was due to a bleeding corpus luteum cyst, the size of which was not noted in the record.

There were 165 cases in which the ovarian cyst was found incidentally to other preoperatively diagnosed conditions. One hundred sixty, or 96.9 per cent, of these were functional cysts and 5, or 3.1 per cent, were neoplastic. The 5 neoplastic cysts included 2 dermoids, one serous cystadenoma, and 2 papillary serous cystadenomas. One of the dermoid cysts had been described as a solid tumor and diagnosed as an arrhenoblastoma because of amenorrhea and hirsutism.

The surgery performed in the group in which the ovarian cyst was incidental was resection of an ovary, 31 cases, or 20.5 per cent, unilateral oophorectomy, 78, or 46.6 per cent, and bilateral oophorectomy, 56, or 33.9 per cent. Twenty-three, or 13.9 per cent, of the 165 cysts were examined in the operating room by pathologists and 4 were recognized grossly as neoplastic.

It was of interest to note that in 15 of the 165 cases the preoperative diagnosis was acute appendicitis. Two of these actually had a histologic diagnosis of acute suppurative appendicitis but the other appendices were reported normal. In each of the 15 cases a small functional ovarian cyst was removed, 9 by resection of the cyst and 7 by unilateral oophorectomy.

The second basic group was composed of the 5 cysts found in postmenopausal women. As was expected, all of these were neoplastic. It is to be noted, however, that no woman of this group was operated on primarily for ovarian pathology, the neoplastic cysts all being found incidentally. The 5 cysts ranged in size from 2 to 3 cm. There were 2 serous cystadenomas, 2 serous cystomas, and one pseudomucinous cystoma. Two of the cysts were incidental to adenocarcinoma of the uterus. Two were found at operation for procidentia uteri, and one at hysterectomy for leiomyomas of the uterus. All these patients had bilateral oophorectomies but only one cyst was examined in the operating room by a pathologist.

Comment

There were 13 neoplastic cysts found in this series of 203 cases (6.4 per cent) of which 3 (23.4 per cent) were found when ovarian cyst was the primary diagnosis. All cases in the postmenopausal group were found incidentally and all 5 of these cysts (38.3 per cent) were neoplastic.

Was there any factor to indicate neoplasia in the 3 cysts in the first group where ovarian cyst was the preoperative diagnosis? The periods of observation of the cysts were one week, two months, and eight months. The cyst observed for one week was thought preoperatively to be 5 to 6 cm. in diameter, a commonly accepted indication for operation. One cyst watched for eight months was thought to be 4 cm. in diameter but had a marked increase in size in one month. The third neoplastic cyst was small but fixed and tender and was thought to be 5 cm. in diameter preoperatively.

The 5 neoplastic cysts found incidentally constituted 3 per cent of the 165 cases in the premenopausal group. In Cianfrani's[2] series of 1,500 apparently normal ovaries, there were seven neoplasms, ranging from 1 to 2 mm. to 1.5 cm. in diameter. Five of these were in premenopausal women, an incidence of 0.3 per cent neoplastic. Comparatively, our incidence was ten times that in his series. All the neoplastic cysts in our series were evident at operation and measured from 2.0 to 4.5 cm. in diameter. Four of the 5 were diagnosed as neoplasms by a pathologist in the operating room.

An ovarian cyst in postmenopausal patients must be considered as a neoplastic cyst. This was true in our series. Nevertheless, it was a disturbing feature to note that no postmenopausal cyst was operated on primarily, suggesting that perhaps these cysts are being observed too long.

Ninety-six per cent of the 198 premenopausal ovarian cysts were of the functional type. It is understandable why so many functional cysts were removed when they were found incidentally at operation. Sixty-three of the patients were over 40 years of age and it is still a common practice to do bilateral

salpingoophorectomy when hysterectomy is necessary after the age of 40. Furthermore, many surgeons will resect ovaries or do unilateral oophorectomy for ovarian cyst while in the abdomen for abdominal hysterectomy, on the theory of prevention of later operation for existing or future ovarian disease, including neoplastic cysts. Some explanation is in order, however, as to why 33 patients with ovarian cysts less than 5 cm. in diameter were operated on with a preoperative diagnosis of ovarian cyst. Ten of the cases were judged to be 5 cm. or over on preoperative pelvic examination. The length of observation in these 10 cases ranged from one day to one year, but only 3 were observed longer than three months, and none of these 3 were neoplastic. Was this an error in judgment of the size of the cysts or was the cyst rechecked at frequent enough intervals, since functional cysts rarely persist longer than three months?

Since in 12 of the 33 primary ovarian cysts there was no information as to size of the cyst before operation or no pelvic examination was recorded, the accuracy of the estimation of size before operation cannot be evaluated. It was of further interest to find that one general practitioner operated on 6 patients primarily for ovarian cysts while all other general practitioners had no more than 2 cases apiece. Similarly, three gynecologists operated on 8 patients primarily for ovarian cysts and one had 6 cases.

Six of the 13 neoplastic cysts were examined in the operating room and recognized grossly as neoplasms. It is advisable to examine all cysts immediately to determine the extent of the surgery necessary. Although we found no malignant neoplasms in our series of small cysts, the possibility is always present and should be considered.

If we find a functional cyst 4 cm. in diameter and one 1 cm. what chance is there of either being a follicle cyst, corpus luteum, or simple cyst? In Table II we have given from our series the number and percentages of follicle, corpus luteum, and simple cysts of different sizes ranging from a few millimeters to 5 cm. in diameter. We found no definite correlation between the size of small cysts and their histologic type.

TABLE II. NUMBER AND INCIDENCE OF FUNCTIONAL OVARIAN CYSTS

	4-5 CM.		3-4 CM.		2-3 CM.		1-2 CM.		1 CM. & LESS	
TYPE OF CYST	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
1. Follicle	9	8	12	10	20	17	25	22	49	43
2. Corpus luteum	6	12	15	29	15	29	10	18	6	12
3. Simple	4	18	8	34	7	30	4	18	None	

Summary

1. A study is presented of 203 ovarian cysts other than endometriosis and less than 5 cm. in diameter removed over a two-year period at an open-staff general hospital.

2. The incidence of neoplastic cysts in the series was 13, or 6.4 per cent.

3. All of the cysts found in postmenopausal women were neoplastic.

4. The incidence of neoplastic cysts in 198 premenopausal patients was 8, or 4 per cent. The incidence of neoplastic cysts in the 33 premenopausal patients

operated upon primarily for ovarian cyst was 3, or 9.1 per cent. In the 165 cases, in which the ovarian cyst was found incidentally, 5, or 3.1 per cent, were neoplastic.

5. No malignant neoplastic cysts were present in this series.

6. Rapid increase in size of a cyst to approximately 5 cm. when observed over a period of three months or more, and fixation of the cyst, were observed in 2 of the 3 neoplastic cysts in patients in whom ovarian cyst was the primary indication for operation.

7. Functional cysts constituted 93.6 per cent of the entire series and 96 per cent in the premenopausal group but were not found at all in the postmenopausal group.

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Discussion

DR. COURTLANDT D. BERRY, Orlando, Fla.—Dr. Smith's excellent presentation affords us another opportunity to consider the perplexing clinical and pathological problem of the ovarian cyst. I wish to amplify two points raised in this presentation:

1. There appears to be no agreement among gynecologists, and pathologists as to the precise size which an enlarging follicle or corpus luteum must reach before it is considered a disease instead of a physiological state. The rarity of these so-called functional cysts at operation or autopsy in the postmenopausal woman indicates that many "cysts" are self-limiting. It is possible that in the absence of pain, hemorrhage, or severe disturbance of uterine activity many of these "cysts" in the young women could be safely observed. If they are operated upon and properly identified, they may be left alone or resected without oophorectomy. Gynecologists and surgeons should establish for themselves fair standards of the normal and abnormal and be able to distinguish at the operating table ovarian physiology from ovarian pathology.

2. Recent published statistics obtained by the Public Health Service show that in each 100,000 women there will occur 10 to 15 ovarian cancers, and the death rates of this disease are slightly lower. Cancer of the ovary is not common. In the pathology department of the Orange Memorial Hospital in the year 1955, 6,000 surgical specimens were examined and 8 primary ovarian cancers recognized. Such figures indicate the inherent difficulty in justifying "prophylactic oophorectomy." If prophylactic oophorectomy at the time of hysterectomy is recommended because of cancer prevention, I submit that many ovaries will have to be extirpated before the one that was going to be malignant will be removed.

DR. THOMAS W. HUEY, JR., Charlotte, N. C.—Drs. Smith and Foster have presented a series of 203 small (5 cm. in diameter or less) ovarian cysts removed by operation, either as the result of a primary diagnosis or as an incidental procedure. Of these, 13, or 6.4 per cent, were neoplastic. The remainder were nonneoplastic or functional. None were malignant.

They have analyzed their cases to determine if the usual indications are valid or whether more liberal indications are justified by the threat of neoplasia.

To contribute to this discussion, the cross index file of the Department of Pathology of the Charlotte Memorial Hospital, Charlotte, North Carolina, was examined. From Jan. 1, 1950, to July 1, 1955, 279 cases labeled ovarian cyst were found. Of these, 157 were cysts over 5 cm. in diameter. Of the 122 cases 5 cm. or less in diameter, 91 were considered to be nonneoplastic, while 31, or 25 per cent, were diagnosed as true neoplasms.

The break-down on the neoplastic cysts is as follows:

Dermoid cysts	13
Pseudomucinous cystadenoma	3
Serous cystadenoma	13
Granulosa-cell tumor	2

All slides in question were reviewed and the diagnosis of neoplasm confirmed. All were benign with the possible exception of the granulosa-cell tumors, which were probably benign.

A statistical comparison of the material from Crawford Long Hospital is not possible since a tremendous number of small functional cysts are not labeled cysts by the Pathology Department of Charlotte Memorial Hospital, but are filed in the cross index under normal ovary. This may explain the 25 per cent incidence of neoplasia in small ovarian cysts at Charlotte Memorial Hospital, which seems incredibly high.

From the foregoing certain conclusions seem warranted: (1) The commonly accepted criteria for surgery for ovarian cysts are valid. (2) A sense of complacency about small ovarian cysts is not justified. Too many neoplastic small ovarian cysts were found. Malignancy may develop in these cysts. They must be watched. (3) The majority of small ovarian cysts are functional and require no treatment other than observation.

GYNECOLOGIC REPERCUSSIONS OF THE MODERN SOCIAL SCENE*

ELEANOR B. EASLEY, M.D., DURHAM, N. C.

YEAR after year in our office we struggle with another bumper crop of functional problems in women. And year after year, in this era of favorable regard for the psychosomatic concept, the list lengthens of syndromes assumed or suspected to belong in this category. At this time I do not propose to deal with the physiologic derangements concerned, but rather to examine the factors associated with the mental and emotional turmoil behind these derangements.

A phenomenon related to the frequent occurrence of functional gynecologic conditions is the large number of women with problem personalities—nagging wives, frigid wives, hyperindulgent mothers. The literature describing these exasperating personality patterns is voluminous, but few authors have attempted to deal with their pathogenesis. One eminent author[1] has attributed these problem personalities to intrinsic peculiarities of female psychology. In a recent excellent article,[2] the finger of suspicion has been removed from the psychologic processes of the female and redirected toward the external forces which condition those processes. This new concept I count progress, and implicit in it there is the hope of more progress. Although I am admittedly biased on this subject by belonging to the female sex, I resist the idea that women are born with a natural tendency to become cussed and cantankerous. Rather, I think that inadvertently, on a mass scale, they are being unfavorably conditioned. The process of growing up in our society causes an inordinate number of amiable, charming little girls to develop into warped, unattractive mature females. We need to find what causes this unfortunate transition and try to change it. We know that the pattern is not invariable, since many women are happy, attractive, and productive citizens. The need to remedy women's troubles is almost as important to men as to women, since the true welfare of one sex depends on that of the other. A woman who is a problem to herself is a problem to her husband and to her children.

It is a commonplace that in women mental and emotional turmoil usually will be found to be related, directly or indirectly, to the area of reproduction. As we try to think through problems in this area, we are all handicapped by being personally involved in the very problems with which we are struggling. We are handicapped further by their extraordinary complexity since they involve both the intricacies of the human personality and the intricacies of human interrelationships.

In this area of reproduction, trouble has always plagued the whole human race. Every known human society has found it necessary to impose by law

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regulations and restrictions concerning the relationships between men and women; and around the laws there have further grown up customs. Both laws and customs have had, as one of their most important objectives, persuading or coercing men to nurture women and children. Men's help has been needed, first because pregnancy and delivery are sometimes hazardous and often incapacitating to women, and, second, because human children are helpless and need adult care for many years. Bluntly stated, men have been pressured by society, for the sake of race preservation, to share in the troublesome responsibilities of reproduction to which women are tied biologically. Needless to say, they have not been altogether happy about this. Sometimes their resentment is open and intense; more often it is vague and half conscious. Paradoxically, it is directed toward women—not toward society or the need for race survival, since these are not satisfactory, tangible objects for resentment! Although men are by nature favorably disposed toward women—their endless work for women is obvious—this socially imposed service has made their feeling for women ambivalent.

The laws and customs governing family relationships have varied under the influence of variations in environment and group experience. The basic biologic problem has not changed, however, nor have the interpersonal relationships derived from it—namely, that childbearing women and their children are dependent upon men. Out of this dependency has come subservience; most of the time women have found it necessary to obey the wishes of the males on whom they were dependent, even though their own desires and judgments might have dictated otherwise. This situation could not be other than frustrating to women, and habitual frustration is a recognized psychologic poison.

Men have been able to dominate women if they chose to do so, and it is a matter of simple history that in various times and places they have so chosen, and have treated women badly.[3, 4] This fact is not too surprising. Men and women have always had divergent personal objectives, and the adjustments have not been easy for either sex. Women have been the instrument, if not the cause, of a great deal of trouble which men have resented. They have felt that women were in their debt and should do their bidding. From this domination has arisen women's ambivalent feeling for men. Men and children are women's first requirements. But women have egos as well as libidos and maternal instincts. They do not like to be pushed around. They have fought back openly and underhandedly; their weapons have been children, sexual gratification, companionship, and work. But the use of these as weapons has been unsatisfactory. They are women's needs as well as men's needs, and to use them against men, women have had to deny themselves also. Remember the feminist movement which, however unattractive, accomplished a great deal. Its major premise, however, was that all women's troubles were due to men and reproduction, and that the thing to do, therefore, was to get along without both. This premise was fallacious and quite unacceptable to nearly all women.

Women's envy of male privilege is evident. Psychiatrists write about penis envy. Many a small girl has no notion that there is such a thing as a

penis, yet looks at the adults around her and wishes she were male. I think there is prerogative envy mixed up with penis envy. Psychiatrists tell us, also, that small girls regularly identify first with their fathers instead of their mothers. The process of reorientation is traumatizing as well as time consuming. Some girls never manage to reorient successfully as females, but develop what Barnes[2] has called a "denial of femininity syndrome." He thinks this is the psychological mechanism sometimes responsible for gynecologic symptoms such as dysmenorrhea, frigidity, and even dystocia.

The division of labor between men and women has been based chiefly on the naturally different potentialities of the two sexes, and has produced important secondary effects.[5] Throughout most of the world for most of the time, the total economy of human effort has been important enough to dictate certain reasonable correlations between sex and type of work. Thus "women's work" has always been limited to some extent by their inferior muscular development, and, to a greater extent, by pregnancy and lactation and their natural sequel, child care. Taken together, pregnancy and child care have pre-empted a significant amount of women's time, so that their quantitative work output otherwise has been less than that of men. "Men's work" has been chosen to take advantage of their superior muscular development and of the fact that they have more time to spend at their jobs since reproduction requires very little of their time. Where long years of education or training have been necessary as preparation for a type of work, social economy has dictated that the training of men take precedence over the training of women, especially if the facilities for such training have been expensive or in short supply.

Men's work advantages, their educational advantages, and their greater available time have combined to give them wider experience and more varied capabilities. In effect, many of them through superior opportunity have become superior to their women. Somewhere the idea started that this was a natural, not a derived, superiority; that it was intrinsic to all males as compared with females; and that it pertained in all matters. The males have treasured this notion and the females have resisted it. The females have been particularly infuriated when this assumption has had the effect of causing their testimony to be automatically discounted in instances where a male-female difference of opinion could not be settled objectively. In our country educational and general opportunities for boys and girls are roughly equal. Before puberty—that is to say before the reproductive handicap has an appreciable effect upon the girls—aptitude differences between the sexes are readily demonstrated by the use of intelligence and achievement tests. However, the superiorities in the different categories are about equally divided between boys and girls. Male superiority in muscular development is undoubted, of course.

While the social scene in our country is complex and constantly changing, some of its major characteristics are apparent. We are a dynamic, not a static society, and the predominant cultural values drilled into both little boys and little girls are education, success, progress, and individual freedom.[7] Money

and prestige are our most important criteria of success. Our most admired men are well educated, earn "good money," have done better than their fathers, and are their own bosses.

For women, however, industry, ingenuity, and efficiency do not bring direct rewards. Success for a woman means to get and keep a husband. Prestige is hers, not if she is competent but if her husband is successful. And so we have nagging wives. It is not what a woman can do that counts most, but what she *is*, especially whether or not she is physically attractive. She can modify this to a limited degree only, though she tries so hard that sometimes her efforts are ludicrous. There are few more potent psychological poisons than to find that the very best one can do is not good enough. In spite of her best efforts, many a woman cannot manage to get the kind of husband she wants. In this event she has two choices. She may give up and not marry or she may compromise. Too great a compromise is likely to create for her such a conflict that she decompensates socially—that is to say, becomes functionally ill. Right here lies the cause for many a frigid wife; the right man is not available to her.

If our lady is maximally successful, however, she ends up a housewife. There are certain features of "housewifing" that are exceedingly hard to reconcile with our cultural values. Many a woman, so devoted to her husband and children that she wouldn't change her situation if she could, still detests being a housewife for many good reasons. She earns no money directly. Much of her work is intrinsically dull and repetitious. Industry has taken over, and does more efficiently, many things that formerly she found interesting. Because of world economics and overpopulation, families nowadays contain fewer children. For this reason childbearing and child care—emotionally the most rewarding components—are a smaller part of her work. Her hours are very long when the children are small, and there are no vacations from small children. When the children are gone, she has not enough to do. Until recently education has ignored her problems and has not prepared her to be maximally efficient in the home or to use her spare time effectively.[8] And she is accorded little prestige, even if she is a marvel of efficiency. Housewifing is maintenance, in this country and era that dote on progress!

A woman relates her own situation to that of her husband. A farm housewife whose husband tends his fields and animals as many hours per week as she tends her house and babies is likely to be quite contented. One of our most discontented and troublesome recent obstetric patients was the wife of a forty-hour-per-week man who played golf all his spare time while she tended their three little girls. "I never get to go anywhere but here and the grocery store," she said. She complained all through her pregnancy and begged to have her tubes tied. At each prenatal visit she took twice as much time as an average patient. In the higher social strata the problem is a little different. The wife of a great man, or a moderately successful man—say a doctor or a professor—feels very insignificant as she compares her work with her husband's work and observes the prestige accorded him.

In summary, modern woman finds herself in a contradictory situation. Her age-old, full-time job of reproduction is no longer full time. She has left over from it many relatively empty years. It prepares her for no other work which is highly regarded or highly remunerated. Much of the prestige has gone out of it, but she still finds it emotionally rewarding and compellingly attractive. Though not full time, it still requires a significant amount of her time—enough that in the division of labor she is up against the same old disadvantage as compared with her husband. Thanks to the machine, she is now able to do almost any kind of work that men can do. But if the machine has devalued human muscle power, it has at the same time put a premium on education, training, and experience. These latter, while available to modern woman, are expensive. Once again, therefore, social economy dictates that her husband take precedence. Any number of laws giving her equal rights do not change this situation at all.

Having discovered that she is competent at remunerative and intrinsically interesting work, she is less satisfied with complete economic dependence on her husband and the dull tedium of housework. Furthermore she is afraid of it. She is afraid of the subservience that goes with complete dependency. And what if her husband dies or is disabled? How can she earn money for her children in this advanced civilization if she is uneducated and untrained?

There is one more consideration. The world in which woman finds herself is still a man's world, fashioned by men while she maintained the race. They have done a fabulous job, but a masculine job. Modern woman feels that she can fashion things more to her liking if she participates in some of the world's important work. In the past, working exclusively through her influence on her sons, her husband, and her father, she has failed to accomplish this purpose. And so it happens, not infrequently, that we find her dissatisfied with being "only" a housewife, and expressing this dissatisfaction in ways which sooner or later make her a problem—for herself, her husband, her children, her doctor, and sometimes the psychiatrist.

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Discussion

DR. LEWIS S. RATHBUN, Asheville, N. C.—I would certainly agree that the forces shaping these ills are external and not intrinsic. Dr. Easley points out that women have egos as well as libidos and maternal instincts. It is the repercussions of the modern social scene upon these egos that give us most of our functional complaints.

More specifically, it seems to me, it is the repercussions of the social scene against the narcissism and self-esteem that cause these symptoms.

Dr. Easley has enumerated many of the situations which reduce self-esteem, among them dependency on and subservience to men; inferior training and education; fear of financial insecurity if the male provider is lost; failure to wed; lessening of the time and effort required to accomplish "woman's work."

I believe the particular situations developed in her paper pertain mostly to the upper strata of society.

There are many repercussions of the modern social order on the poor, uneducated woman. These, too, deal with her self-love and self-esteem.

One is the trend toward younger marriages started by World War II. It is common now to find a girl aged 22 or 23 in the office with functional complaints. Her history reveals marriage at the age of 17 to a boy 18 or 19. He has been forced into an unremunerative job with no future by his sudden responsibilities. By the time our patient is 22 she has 2 or 3 children. She has missed the school dances and other good times that she should have enjoyed in late adolescence. She has been forced into responsibilities too early. Her husband is spending his time and energy in keeping up the installment payments. No one has said a kind word to her in several years. The only way this girl can get any attention and recognition from society is to develop physical complaints, which she promptly does.

This patient is not a product of being inferior to her husband, or of too much leisure time, or too many kitchen gadgets. She simply has to feel that she amounts to something.

Other parts of our social scene tending to influence our young ladies are the movies and magazines. Many women, whose gynecologic complaints stem from marital difficulties, expect too much of marriage. They expect their lives to resemble the movies. When the husband comes home at night tired and irritable from a harrowing day at his job and fails to act like a screen lover the wife rebels and tensions develop. Tensions lead to symptoms and the symptoms are usually gynecologic in nature.

If our girls had been conditioned to look upon marriage as a battle where the couple stands against the world, as in Dr. Easley's illustration of the farmer and his wife, they would react differently to many of their situations and the gynecologist would be saved many visits.

It can be said, then, that our social order affords more opportunities than ever before for the feeling of self-esteem, so necessary to our mental health, to be destroyed. It makes no difference from what walk of life our patient comes. Whenever this self-esteem is destroyed psychosomatic ills will attempt to raise it from the dead.

Dr. Easley has added to our knowledge and understanding of the functional complaints of our patients. The great challenge to us all is to find a method of treatment. So many of the causative situations, when found, defy remedy.

We hear every day that our scientific knowledge of hydrogen bombs et cetera has outstripped our moral sense and ability to get along with one another. It seems also that our modern social scene is outstripping our nervous systems. Possibly we are making a mistake in attempting to change the individuals so that they can cope with the social scene. Maybe in the end we will have to change the social scene to conform to our basic natures if we are to survive.

DR. RICHARD L. PEARSE, Durham, N. C.—Certainly women are not born innately obdurate and perverse. They were always tidier, more mature in their behavior, and always had the answers to the algebra problems. The valedictorian of our class was a girl and she was smarter than all the rest of us of either sex. The emotional and intellectual endowment and motivation are of greater importance than the sex.

Males have not been dragooned into providing for women and children. From primitive times the world over they have placed the highest valuation on their wives and children. They have been willing to undergo terrific privations and perform great exploits to sustain

and cherish them. The male ego is maintained by providing for the family, leading and protecting it. The male ego shrivels if he gives up his birthright and permits his partner to take up his duties so that he may enjoy ease or material benefits.

Men have treated women badly historically. Men have treated men badly, too. We have oppressed, tortured, burned, maimed, held in slavery, and done all sorts of things that we ought not to have done. Women's lot improves as mankind's concepts of conduct in general become more ethical.

The differences between men and women as sexes are more than purely muscular. Regardless of the age, religious or economic background, women so endowed and motivated have emerged as military, political, and business leaders. As competitors they have been shrewdly realistic and more ruthless than their male contemporaries. Males have always been preoccupied with large concepts and ideals. One ideal that has cost males dearly in life and blood, for example, is the chivalric ideal. No female has founded a religion, started a Reformation, or emerged as an explorer of the physical world or of the world of the mind. There has never been a female Mozart, Einstein, or Schweitzer at any age. I can give no tables on the relative number of male and female martyrs. To say, however, that one sex is superior to the other is as pointless as saying that Republicans are superior to Baptists.

The carefully reasoned contentions of the essayist are, I feel, of little importance in the production of so many demanding dowagers and discontented wives. The viewpoint is completely and totally materialistic. "Money and prestige are our most important criteria of success." According to the essayist, women would be happier if they received more money and prestige for doing their work as wives and mothers. They should be prepared for remunerative work, and the sex differential in educational and training advantages should be eliminated. Their economic dependence on males and consequent subservience to males should be eliminated. Women should have a greater and more direct voice in managing the world. The manifesto is reasonable but precisely the sort of demands Walter Reuther and John Lewis present to management. Any humanitarian is not hostile to these and, as the world changes, the demands may well be realized.

The gynecologic turmoil of the modern scene comes because materialistic values have replaced ethical, moral, and spiritual values. For example, the impetus and satisfactions of religion in daily life are not prominent. As the sociologist Reisman has pointed out, we no longer move toward spiritual, intellectual, or moral objectives as men did following the Renaissance through the nineteenth century. Our objective has become the approbation of our fellows, to be liked, to conform. Nobody dares to be very different, or he is stigmatized as eccentric.

With the destruction of males in wars, more opportunities have been afforded women to emerge as competitors in the ugly, tense, ruthless work-a-day world. They are competing for the highly valued material benefits, money, prestige, economic independence, houses, television sets, cars and bicycles for the children—a higher scale of living. For these tangible benefits women have to pay the emotional penalties of any competitor. They are not penalized because of their sex but because they are competitors.

What a woman is physically and emotionally, I am thankful to say, is far more important than what she can do. I cannot pull a series of records to prove my point as Mauzy always does. The volume of literature and in particular poetry in praise of women who are attractive wives and devoted mothers far exceeds that inspired by Catherine the Great, Hetty Green, or Claire Booth Luce. Those inexplicable qualities that send women traipsing after their husbands by plane, train, and sidecar in wartime, send them out to have babies in covered wagons and on gun decks, cause them to wipe many small runny noses and patiently cherish squalling children day and night are so valuable that there is not enough gold in Fort Knox to remunerate them. I agree, you see, wholeheartedly on one point, Dr. Easley.

Original Communications

DISORDERS OF THE HEARTBEAT DURING PREGNANCY

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DISORDERS of the heartbeat are not commonly encountered in obstetric practice. Although they may be seen in otherwise normal patients as well as in those with organic heart disease, the mere presence of these disorders may evoke seemingly difficult problems in medical and obstetric management. The current high maternal mortality associated with heart disease represents a serious challenge. The obstetrician can ill afford to depend entirely upon his internist colleagues for solutions to every cardiac problem. Cardiologists, on the other hand, rarely fully appreciate the associated obstetric implications. Well-regulated obstetric-cardiac clinics are being established throughout the country. In this manner, a mutual appreciation of the problem is possible. The purpose of this study is to analyze each of the disorders of heartbeat in relation to published reports and experiences at the New York Lying-In Hospital from Sept. 1, 1932, through Dec. 31, 1955. During this period organic heart disease has been diagnosed in 3,252 patients (3.5 per cent) of the 92,315 pregnancies cared for in the clinic. The disorders of heartbeat to be considered are classified in Table I.

TABLE I. DISORDERS OF THE HEARTBEAT

Disturbances of the pacemaker	
	Sinus tachycardia
	Sinus bradycardia
	Sinus arrhythmia
	Sinus pauses
	Wandering pacemaker
Disturbances in conduction	
	Sinoauricular block
	Prolonged auriculoventricular conduction
	Partial heart block
	Complete heart block
Disturbances due to ectopic beats	
	Premature beats
	Paroxysmal tachycardia
	Flutter
	Fibrillation
	Escaped beats
Pulsus alternans	

Disturbances of the Pacemaker

Sinus Tachycardia.—

The observations of Hamilton, Thomson,[1] and others indicate that the pulse rate rises early in pregnancy, reaching a maximum about the eighth month, and

then decreases toward term. Although the acceleration rate is only about ten beats per minute, its duration throughout most of pregnancy makes for considerable extra work in term of total heartbeats. Mendelson and Pardee[2, 3] studied the pulse and respiratory variations during labor in normal women and those with rheumatic heart disease. Normal patients show a slight transient rise in pulse rate during uterine contractions, but otherwise the rate remains constant until voluntary bearing-down efforts are brought into play in the second stage of labor. At this time, most patients show increased rates, which may exceed 110 per minute in 10 per cent of cases (Fig. 1). Patients with rheumatic heart disease behave in a similar manner, except that values above 110 per minute may occur in the first stage of labor, heralding the approach of cardiac failure. These observations have led to the use of pulse charts during labor, as a guide to the cardiac status in patients with rheumatic heart disease. Following delivery the pulse rate returns to normal.

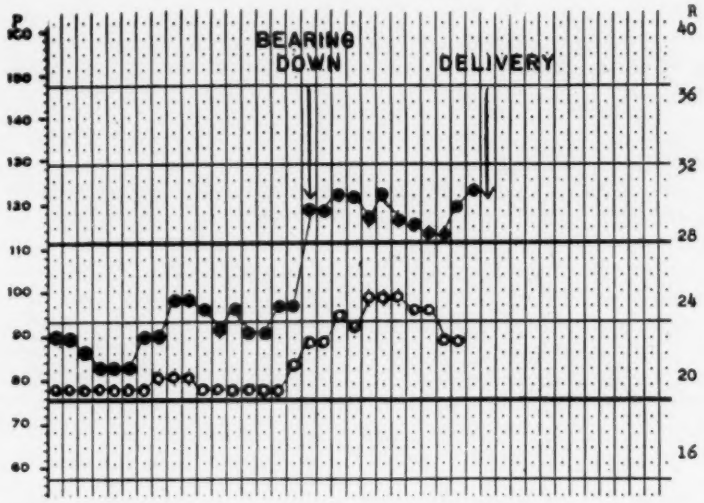


Fig. 1.—Pulse and respirations in the latter part of labor. Primigravida with labor totaling 25 hours. Recordings every 15 minutes showing increase in pulse rate with onset of bearing-down efforts. Pulse rate had been maintained at about 80 to 90 per minute throughout earlier part of labor.

Sinus tachycardia may occur during pregnancy, due to any of the usual causes. By itself it has no special medical or obstetric implications. Extremely disturbing circulatory effects and difficult diagnostic problems may occasionally be produced. We have observed 4 patients in whom changes from the erect or sitting position to the recumbent attitude resulted in a rapid rise in the pulse rate from initial levels of about 80 to levels of 160, or higher, accompanied by syncope due to cerebral anoxia. Although these changes occurred within one minute, they were progressive rather than instantaneous as in true paroxysmal tachycardia. Symptoms started in the seventh month in 2 patients, and appeared intra partum for the first time in another case.

The first patient had Class 1 rheumatic heart disease. Attacks become so frequent and alarming that hospitalization was advised. Various diagnoses were entertained including hysteria, decompensation, epilepsy, hypoglycemia, and ball valve thrombus. Emphasis on the last possibility led to grave concern, and a cesarean section was performed with the patient sitting erect on the operating table. There were no attacks during the puerperium. Follow-up examinations showed the patient to be completely free of symptoms, and angiocardiograms failed to disclose the presence of a thrombus in the heart. She again became pregnant, and developed similar symptoms in the seventh month, as before. Serial electrocardiograms showed the syncopal attacks to be definitely correlated with alterations in pulse rate coincident with

postural changes. Despite the disturbing symptoms, the patient went through pregnancy without cardiac difficulty. Cesarean section was repeated because of the previous operation and again there were no further attacks following delivery.

A correct diagnosis was made in the other 3 cases and obstetric interference was not prompted. All had normal vaginal deliveries and were free of attacks thereafter. One also had rheumatic heart disease, and two had no organic heart disease. Anoxia accompanying the intrapartum attack was not severe enough to compromise the fetus, although this could conceivably occur. Fig. 2 illustrates the electrocardiographic findings as attacks were produced by postural changes in the first case. The clinical picture in these 4 patients corresponds to that described as "postural shock" of pregnancy, which has been attributed to obstruction of venous return by the pregnant uterus. It appears more likely, however, that tachycardia itself is the initiating mechanism. The fact that the attacks came on late in pregnancy suggests that vagal influence may be created by diaphragmatic pressure.

Naturally, the onset of sinus tachycardia following delivery should lead one to think of other specific complications, including hemorrhage, shock, atelectasis, aspiration of liquid gastric contents,[63] amniotic fluid embolism, and pulmonary embolism.

Sinus Bradycardia.—

Postpartum bradycardia has received considerable attention in the obstetric literature. Jensen[4] found over sixty papers on this subject, and he observed, "During the second half of the last century the discussion raged, and discord reigned on every conceivable phase of the subject; then interest vanished almost as suddenly as it had risen, though hardly a question had been settled." The reported incidence of bradycardia and its duration vary considerably and actual heart block may have gone unrecognized. Prolonged puerperal bed rest prior to the advent of early ambulation undoubtedly contributed to many cases of reported bradycardia. We have observed that, if postpartum bradycardia occurs, it is usually relative, and represents a return to normal from elevated levels of pregnancy. Bradycardia has no significance in the absence of heart block.

Sinus Arrhythmia.—

Sinus arrhythmia refers to cardiac irregularity in which acceleration and retardation of the pulse occur, usually in phase with the respirations. It is of no importance in pregnancy, except that, when marked, it may be confused with more serious irregularities such as auricular fibrillation or heart block. Pregnancy does not alter susceptibility to sinus arrhythmia.

Sinus Pauses.—

Inhibition of the cardiac pacemaker due to reflex vagal stimulation may lead to complete failure of impulses for varying lengths of time. Such sinus pauses may produce dizziness and fainting similar to Adams-Stokes syndrome of complete heart block. Sinus pauses have not been reported in pregnancy, but it is conceivable that they may have been overlooked in the absence of electrocardiographic studies.

Wandering Pacemaker.—

The normal site of the stimulus may change its location within the sinus node, or may shift back and forth to the auriculoventricular system resulting in an arrhythmia recognizable only in the electrocardiogram. The P waves shift location with respect to the QRS complexes and the P-R time is variable. This disturbance occurs in normal patients, produces no symptoms, and requires no treatment. It may be transient or persistent and it is occasionally also encountered with digitalis therapy or carotid sinus hypersensitivity. Cases have not been reported in pregnancy.

Disturbances in Conduction

Sinoauricular Block.—

We have been unable to find any references to sinoauricular block in the obstetric literature, but have encountered this complication in one case at the New York Lying-In Hospital. The patient was a 32-year-old white primigravida with a normal pelvis and negative serologic test for syphilis, whose

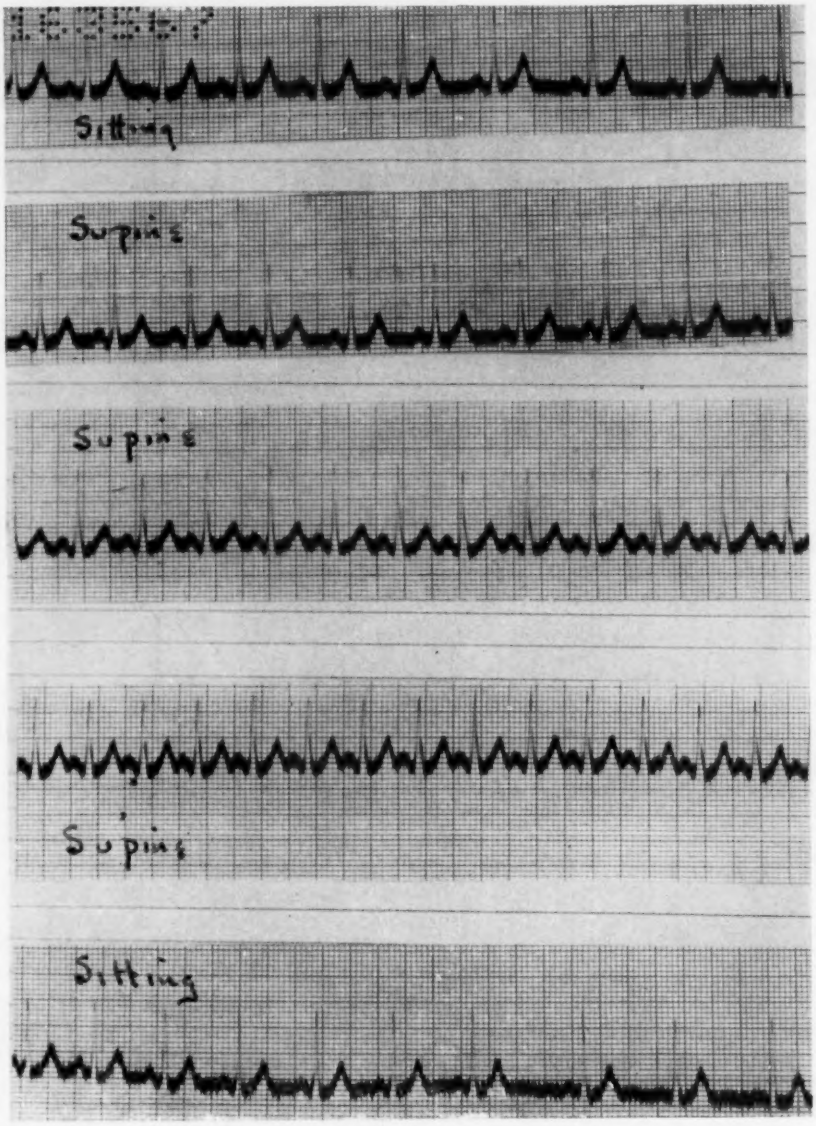


Fig. 2.—Rapid development of sinus tachycardia in the supine position. Patient seven months pregnant and subject to syncopal attacks throughout last trimester.

family history was irrelevant, and whose past history was normal except for occasional attacks of fainting, which had been variously attributed to anxiety, hypoglycemia, and petit mal. The general physical examination, x-rays of the

TABLE II. FIRST-DEGREE HEART BLOCK, NEW YORK LYING-IN HOSPITAL. P-R INTERVAL OVER 0.2 SECONDS

CASE	AGE	PARITY	GRAVIDITY	P-R INTERVAL	ETIOLOGY	FUNCTIONAL CLASS	PROBABLE CARDITIS	DIGITALIS	DELIVERY	TUBAL LIGATION	BABY	MOTHER
1	29	ii	iv	.22	Rheumatic	2	0	0	Term vaginal	0	Lived	Lived
2	29	i	ii	.21	Rheumatic	2	0	0	Term vaginal	0	Lived	Lived
3	29	0	ii	.28	Rheumatic	4	0	+	Term vaginal	+	Lived	Lived
4	23	ii	iii	.22	Rheumatic	1	+	0	Term vaginal	0	Lived	Lived
5	16	0	i	.24	Toxemia	3	0	+	Term vaginal	0	Lived	Lived
6	23	0	i	.22	Rheumatic	3	0	+	Term vaginal	0	Lived	Lived
7	30	iv	v	.24	Rheumatic	1	0	0	Term vaginal	0	Lived	Lived
8	31	0	i	.24	Rheumatic	4	0	+	Term vaginal	0	Died	Lived
9	29	0	ii	.22	Rheumatic	3	+	0	Therapeutic abortion	0	—	Lived
10	31	0	v	.22	Rheumatic	4	0	+	Hysterotomy	0	—	Lived
11	34	iii	iv	.22	Rheumatic	4	+	+	Therapeutic abortion	+	—	Lived
12	26	i	ii	.24	Rheumatic	2	0	0	Term vaginal	0	Lived	Lived
13	23	ii	iii	.23	Rheumatic	3	0	+	Therapeutic abortion	+	—	Lived
14	27	i	ii	.28	Rheumatic	2	0	0	Term vaginal	0	Lived	Lived
15	27	iii	iv	.23	Rheumatic	1	0	0	Term vaginal	0	Lived	Lived
16	23	i	ii	.22	Rheumatic	1	+	0	Term vaginal	0	Lived	Lived
17	20	0	i	.23	Rheumatic	2	0	0	Term vaginal	0	Lived	Lived

heart, and exercise tests were normal. The electrocardiogram revealed a sinoauricular block (Fig. 3). The patient had only occasional attacks of fainting, required no specific therapy, and had three normal term deliveries. Antepartum attacks were no more or less frequent than those in the nonpregnant state and none occurred during labor or the puerperium.

Sinoauricular block refers to impulse obstruction between the sinoauricular node and the auricular muscle. This condition is rare compared to auriculoventricular block. Occasionally it is seen in normal, healthy individuals, but is usually observed with digitalis intoxication, diphtheria, rheumatic fever, chronic heart disease, syphilis, and hyperthyroidism. Since neither auricles nor ventricles receive an impulse from the sinoauricular node, there is a complete loss of the heart cycle and no auricular wave can be detected in the jugular vein. The pacemaker remains undisturbed, so the duration of the pause is equal to the number of beats blocked. Sinoauricular block requires no specific therapy, unless syncopal attacks become disturbing, in which case ephedrine or atropine may be used. There are no special obstetric implications once a correct diagnosis is made and symptoms explained.

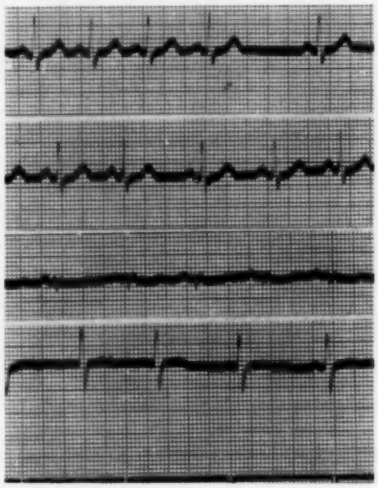


Fig. 3.—Sinoauricular block in Lead I. Patient subject to syncopal attacks throughout pregnancy.

Auriculoventricular Block (Delayed Conduction Time).—

Prolonged auriculoventricular conduction (first-degree heart block) has received virtually no attention in the obstetric literature. Hamilton and Thomson[1] found a significantly prolonged P-R interval in only 2 cases. Both patients had rheumatic heart disease without clinical evidence of active carditis, and both carried through pregnancy without difficulty.

New York Lying-In Hospital experiences: We have encountered 17 cases with prolonged P-R interval over 0.2 second. The pertinent data in these cases are summarized in Table II.

Analysis of data: The average age was 27 years. Four patients were primigravidas, and 13 were multigravidas. The P-R interval ranged from 0.21 second to 0.28 second (Fig. 4 shows a P-R interval of 0.28 second in Case 14). All patients had normal sinus rhythm. Sixteen patients had rheumatic heart disease, and one had eclampsia. Almost 50 per cent of the patients were in the serious functional group (Class 3 and Class 4), whereas only 12 per cent of the

total cardiac clinic patients are in this category. Seven patients received digitalis. Cases 3, 5, and 13 received digitalis before the electrocardiogram was recorded, and their prolonged P-R intervals may have been due to drug intoxication. Cases 6, 8, 10, and 11 had electrocardiograms before administration of digitalis. Only 4 patients showed other definite evidence of active rheumatic fever. Pregnancy was interrupted 4 times because of advanced rheumatic valvular disease, 3 times by therapeutic abortion and once by hysterotomy. Two of these patients (Cases 10 and 11) had become decompensated in a previous pregnancy. Thirteen patients, including 2 with definite rheumatic activity, were delivered vaginally at term. Three patients had puerperal tubal ligation because of advanced rheumatic valvular disease. All 17 patients survived. There were 5 infants lost, 4 from interruption of pregnancy, and 1 from obstetric trauma (intracranial hemorrhage following prolonged labor and difficult breech delivery).

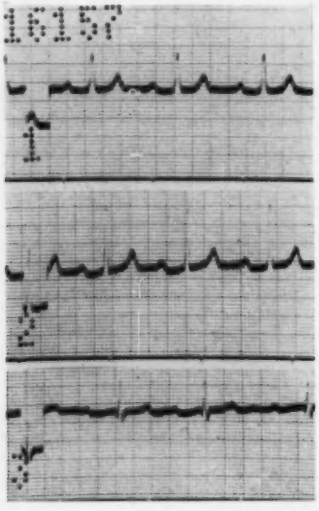


Fig. 4.—P-R interval of 0.28 second in Case 14 of first-degree heart block. Patient showed no other evidence of carditis and experienced no cardiac difficulty.

Comment: Delayed auriculoventricular conduction refers to a P-R interval arbitrarily greater than 0.2 second. There is no actual blocking of beats, since the impulses are merely delayed along the usual conduction path, and the rhythm remains normal. Diagnosis is, therefore, made by the electrocardiogram, although the presence of gallop rhythm or decreased intensity of the first heart sound may lead one to suspect its presence. Prolongation of the P-R interval above 0.2 second is generally considered to suggest rheumatic activity, unless accounted for by digitalis and/or severe heart damage. Clinically recognizable active rheumatic fever is rare during pregnancy. Laboratory data ordinarily employed in determining rheumatic activity are unreliable in the pregnant woman. The white blood count, sedimentation rate, gamma globulin, and c-reactive protein may be elevated in normal gestation. We have made a diagnosis of active rheumatic fever only 9 times in 2,918 patients with rheumatic heart disease, and 4 of these patients had first-degree heart block. None of the New York Lying-In Hospital 22 cases of chorea gravidarum, 21 cases of chronic auricular fibrillation, or 20 women who died of rheumatic heart disease had prolonged P-R interval or other clinical evidence of active

rheumatic fever. Histological sections of the 17 auricular appendages secured at antepartum mitral commissurotomy showed Aschoff bodies in 5 cases, but none of these patients showed first-degree heart block or other clinical evidence of carditis. Similar findings in other larger commissurotomy series in males and nonpregnant females have, in fact, questioned the significance of Aschoff bodies as a criterion of rheumatic activity. Rheumatic heart failure during pregnancy is singularly left sided, and almost always associated with advanced valvular pathology. Rheumatic pericarditis and nodules are not reported. All of these facts lead one to conclude that, although active rheumatic fever does occur during pregnancy, it is most uncommon. The author has postulated that adrenal hormone elaboration may exert a protective influence. This may also account for the beneficial effect of pregnant serum on arthritis.

TABLE III. ACQUIRED HEART BLOCK IN PREGNANCY—LITERATURE

CASE	AUTHOR	BLOCK	ETIOLOGY	DELIVERY	RESULT
1	Nanta[5]	Complete	Syphilitic	Vaginal	Survived
2	Freund[6]	Partial	Rheumatic	Miscarriage	Died—endocarditis
3	Walz[7]	Complete	Infectious	Vaginal	Survived
4	Allespach, McDowell[8]	Complete	Rheumatic	Vaginal	Survived
5	Laubry[9]	Complete	Rheumatic	Vaginal	Survived
6	Langley[10]	Complete	Rheumatic	Vaginal	Survived
7	Dressler[11]	Complete	Infectious	Vaginal	Survived
8	Dressler	Complete	Myocarditis	Vaginal	Survived
9	Naujoks[12]	Complete	Rheumatic	Vaginal	Survived
10	Clerc, Levy[13]	Partial	Infectious	Vaginal	Survived
11	Hermann, King[14]	Complete	Rheumatic	Vaginal	Survived
12	Bramwell[15]	Partial	Rheumatic	Vaginal	Died—emboli, failure
13	Herskovics[16]	Complete	Abscess heart	Vaginal	Died—sepsis
14	McIlroy, Rendel[17]	Complete	Myocarditis	Vaginal	Survived
15	Greenhill[18]	Complete	Rheumatic	Cesarean	Survived
16	Bernstein[19]	Complete	Syphilitic	Cesarean	Survived
17	Sigler[20]	Partial	Infectious	Vaginal	Survived
18	Scholder[21]	Complete	Rheumatic	Cesarean	Survived
19	Ottow[22]	Complete	Coronary	Vaginal	Died—eclampsia
20	Diddle[23]	Complete	Rheumatic	Vaginal	Survived
21	Ferschtand, Beavers[24]	Complete	Rheumatic	Cesarean	Survived
22	Zimdahl, Zimmerman[25]	Complete	Infectious	Vaginal	Survived
23	Snaith, Szekely[26]	Complete	Rheumatic	Vaginal	Survived

Nevertheless, 4 of the 17 patients with delayed auriculoventricular conduction did show other definite clinical evidence of active rheumatic fever, and a prolonged P-R interval should lead one to suspect activity, if digitalis effect or other heart disease cannot adequately account for the abnormal conduction time. The fact that almost 50 per cent of patients with first-degree heart block were in the serious functional group (Class 3 and Class 4) also points to the significance of this abnormality. It should also be noted that the other half did not have serious cardiac difficulties, and, therefore, prolongation of the P-R interval per se does not have special implications. The underlying cardiac status should determine medical and obstetric management. Cardiac disability may warrant interruption of pregnancy and/or sterilization, irrespective of the presence or absence of first-degree heart block. The one recorded hysterotomy was performed in the earliest period of the clinic, and would no longer be considered an acceptable procedure on cardiac indications. All of the 13

uninterrupted pregnancies went to term, and the patients were delivered vaginally, including 2 with active rheumatic fever, indicating that neither first-degree heart block nor active rheumatic fever alters the normal course of pregnancy. All 17 patients survived. The fetal losses were not directly related to delayed conduction time; 4 were due to interruption for associated cardiac disability, and one was due to obstetric difficulties.

Heart Block.—

Partial and complete heart block (second- and third-degree block) has received greater attention in the obstetric literature. Nanta[5] described the first case in 1914. In 1948, Mowbray and Bowley[34] thoroughly reviewed the literature and analyzed 35 cases. Since their publication, 7 additional cases[24, 25, 26, 35, 36] have been reported. The 42 cases are divided into acquired and congenital types, and are summarized in Tables III and IV.

TABLE IV.—CONGENITAL HEART BLOCK IN PREGNANCY—LITERATURE

CASE	AUTHOR	BLOCK	DELIVERY	RESULT
1	Jeannin, Clerc[27]	Partial	Cesarean	Survived
2	Laubry[9]	Complete	Vaginal	Survived
3	Titus, Stevens[28]	Complete	Vaginal	Survived
4	McIlroy, Rendel[17]	Complete	Vaginal	Survived
5	Taussig, Harvey, Follis[29]	Complete	Vaginal	Survived
6	Jensen[4]	Complete	Miscarriage	Survived
7	Hamilton, Thomson[1]	Complete	Vaginal	Survived
8	Hamilton, Thomson	Complete	Vaginal	Survived
9	Mitchell, Fettes, Hollander[30]	Complete	Vaginal	Survived—toxemia
10	Jaleski, Morrison[31]	Complete	Vaginal	Survived
11	Yeprez[32]	Complete	Vaginal	Survived
12	Quintin[33]	Complete	Vaginal	Survived
13	Mowbray, Bowley[34]	Complete	Vaginal	Survived
14	Mowbray, Bowley	Complete	Vaginal	Survived—toxemia
15	Mowbray, Bowley	Complete	Cesarean	Died—hypertension, toxemia, cardiac failure
16	Barton, LaDue[35]	Complete	Vaginal	Survived
17	Ferguson, Porter[36]	Complete	Vaginal	Survived
18	Ferguson, Porter	Complete	Vaginal	Survived
19	Snaith, Szekely[26]	Complete	Vaginal	Survived

TABLE V. HEART BLOCK IN PREGNANCY—NEW YORK LYING-IN HOSPTIAL

CASE	AGE	PARITY	GRAVIDITY	ETIOLOGY	BLOCK	FUNCTIONAL CLASS	COMMENT
1	31	0	ii	Rheumatic	Complete	3	Advanced valvular disease. Adams-Stokes syndrome. Hysterotomy, sterilization, survived
2	32	ii	iii	Poliomyelitis	Partial	1	Poliomyelitis at 7 months. Term vaginal delivery. Mother and baby well
3	30	0	i	Rheumatic	Partial	4	Advanced valvular disease. Refused therapeutic abortion. Died undelivered at 13 weeks
4	25	0	i	Congenital	Complete	1	No cardiac symptoms. Term vaginal delivery. Mother and baby well
5	27	0	i	Congenital	Complete	1	No cardiac symptoms. Spontaneous miscarriage at 16 weeks. Mother well

New York Lying-In Hospital experiences: There have been 5 cases of heart block at the New York Lying-In Hospital. They have been divided into acquired and congenital types, and are summarized in Table V.

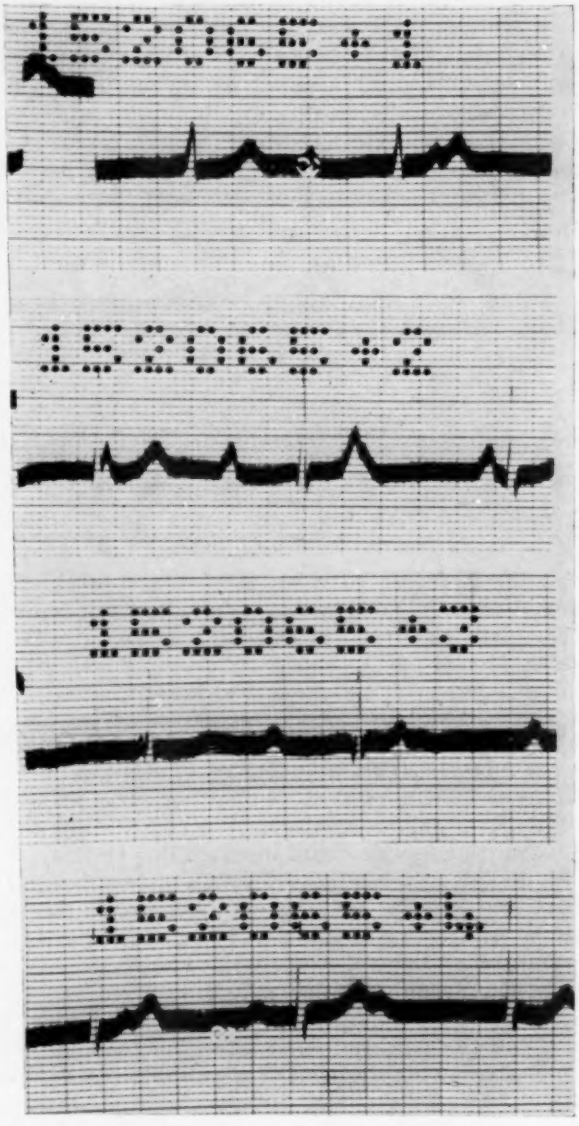


Fig. 5.—Congenital heart block Case 1. Auricular rate of 91 and ventricular rate of 56. Patient completely asymptomatic.

Analysis of data: There are, in all, 26 cases of acquired heart block (Table VI). Fourteen (54 per cent) were associated with chronic rheumatic heart disease. Twelve (46 per cent) occurred with various other diseases. Ages were not recorded in all cases, but ranged from 22 to 38 years. Gravidity was similarly recorded from i to viii. Persistent Adams-Stokes attacks were recorded in 2 cases. Complete heart block occurred in 20 patients, and partial block in 6. There were 5 maternal deaths, all due to serious underlying disease: cardiac

failure with advanced rheumatic valvular disease 2, endocarditis 1, sepsis 1, and eclampsia 1. One patient, who had refused therapeutic abortion, died undelivered in cardiac failure associated with advanced rheumatic valvular disease. One patient miscarried spontaneously, 1 had a hysterotomy and tubal sterilization, 19 were delivered vaginally apparently at term, and 4 were delivered by cesarean section. All cesarean sections were performed on obstetric indications. The recorded fetal loss was 5: 1 intrauterine death (mother died undelivered), 1 spontaneous miscarriage, 1 hysterotomy, and 2 neonatal deaths presumably due to congenital syphilis.

TABLE VI. HEART BLOCK IN PREGNANCY. SUMMARY OF 47 CASES

	CASES	HEART FAILURE	TOXEMIA	DELIVERY	MATERNAL DEATHS	FETAL LOSSES
Acquired	26	2	1	Vaginal 19	Cardiac failure 2	Antepartum death of mother 1
				Cesarean 4	Endocarditis 1	Miscarriage 1
				Miscarriage 1	Sepsis 1	Hysterotomy 1
				Hysterotomy 1	Toxemia 1	Neonatal (syphilitic) 2
				Undelivered 1		
Congenital	21	1	3	Vaginal 17	Toxemia and cardiac failure 1	Miscarriage 2
				Cesarean 2		
				Miscarriage 2		
Total	47	3	4		6	7
Per cent		6	9		13	15

There are in all, 21 cases of congenital heart block (Table VI). The recorded ages ranged from 22 to 36 years. Gravidity was recorded from i to iii. The block was complete in 20 patients, and partial in one. Approximately half the cases probably had an associated intraventricular septal defect. Toxemia was reported in 3 cases. Cardiac failure occurred only once and in association with toxemia superimposed upon hypertensive disease. The sole death occurred in this latter patient. Persistent Adams-Stokes attacks were reported once. Two patients miscarried spontaneously, 17 were delivered vaginally, and 2 were delivered by cesarean section (1 for obstetric indications, and 1 for reasons not given). Spontaneous miscarriage accounted for the 2 recorded fetal losses. Fig. 5 illustrates complete heart block in our Case 1.

Comment: The term "heart block" refers to conduction disturbances in which impulses actually fail to traverse the junctional tissue. The resultant rhythm will depend upon the degree of block. In partial (second-degree) block, varying numbers of impulses reach the ventricles. In complete (third-degree) block, none get through, resulting in an independent ventricular rhythm at a relatively slow rate. Approximately 90 per cent of heart block cases occur past the age of 50, and the condition is twice as common in males as in females. Accordingly, this is a rare complication of pregnancy, as evidenced by the total of only 47 cases.

Patients with heart block may be completely free of symptoms. Some, however, experience palpitation, dyspnea, vertigo, fainting, or convulsive phenomena due to cerebral anoxia. Adams in 1826, and Stokes in 1845, described the clinical picture now referred to as "Adams-Stokes" syndrome. These attacks are most disturbing, and death has occasionally resulted from ventricular standstill or ventricular fibrillation. Cyanosis is seen more in the congenital type due to associated anomalies, usually an intraventricular septal defect. Heart failure is reported only with other complications. Adrenalin, ephedrine, isopropylarterenol (Isuprel), and barium chloride have been used to control Adams-Stokes attacks.

Neither acquired nor congenital heart block per se creates special obstetric problems. Only one patient showed an increased tendency to syncopal attacks during pregnancy. There were no deaths due to ventricular standstill or fibrillation. All 6 maternal deaths were due to serious underlying disease. The same may be said of the 3 cases of heart failure. None of the fetal losses were directly related to the heart block. Interruptions of pregnancy and cesarean sections were performed on other medical and obstetric indications. The hysterotomy in our series also dates back to the earliest days of the clinic, and would no longer be considered an acceptable procedure on cardiac indications.

The congenital cases suggest that routine electrocardiograms in patients with congenital heart disease might reveal undiagnosed conduction defects, especially where the heart rate may be relatively fast and the heart block is likely to escape clinical recognition. If there is cyanosis, oxygen should be administered during labor and delivery to prevent fetal anoxia. The relatively high incidence of toxemia may perhaps be due to placental infarction with circulatory stasis accompanying bradycardia.

Bundle Branch Block.—

The obstetric literature contains very few references to bundle branch block. Price[61] wrote that this conduction disturbance implied grave prognosis and advised termination of pregnancy. Hermann and King[14] believed the finding denoted severe myocardial damage and poor prognosis. Hamilton and Thomson[1] commented that a variety of factors determined the outcome. Pines[37] stated that functional bundle branch block does not mean increased risks in pregnancy. The available data in 16 recorded cases are summarized in Table VII. Unfortunately, many details were omitted in the reports.

TABLE VII. BUNDLE BRANCH BLOCK IN PREGNANCY—LITERATURE

AUTHOR	CASES	ETIOLOGY	CARDIAC FAILURE	DELIVERY	BABY	MOTHER
Hermann, King[14]	2	Rheumatic	+	Vaginal	Died	Died—cardiac failure
		Rheumatic	0	Cesarean section	Lived	Lived
Naish[50]	8	Hyperthyroid	0	Vaginal	Lived	Lived
		Rheumatic	+	Therapeutic abortion	--	Lived
		Rheumatic	+	Therapeutic abortion	--	Lived
		Rheumatic	+	Therapeutic abortion	--	Lived
		Rheumatic	+	Therapeutic abortion	--	Lived
		Rheumatic	+	Cesarean section	Lived	Lived
		Rheumatic	0	Vaginal	Lived	Lived
		Rheumatic	0	Vaginal	Lived	Lived
Jensen[64]	2	Rheumatic hypertensive	+	Cesarean section	Lived	Died—cardiac failure
		Rheumatic	+	Vaginal	Lived	Lived
Pines[37]	1	Functional	0	Vaginal	Lived	Lived
Hamilton, Thomson[1]	2	Functional	0	Vaginal	Died	Died—ruptured uterus
		Rheumatic hypertensive	+	--	Died	Died—undelivered
Abbas, Guild[44]	1	Rheumatic	+	Vaginal	Lived	Lived

TABLE VIII. BUNDLE BRANCH BLOCK IN PREGNANCY—NEW YORK LYING-IN HOSPITAL

CASE	AGE	PARITY	GRAVIDITY	BLOCK*	ETIOLOGY	FUNCTIONAL CLASS	DELIVERY	TUBAL STERILIZATION	MOTHER	BABY	COMMENT
1	30	i	iii	LBBB	Rheumatic	2	Vaginal	0	Lived	Lived	Uneventful pregnancy
2	36	iv	v	RBBB	Undetermined	1	Vaginal	+	Lived	Lived	Uneventful pregnancy
3	35	ii	iii	LBBB	Undetermined	1	Hysterectomy		Lived	--	Multiple fibroids and blighted ovum
4	34	iii	iv	RBBB	Rheumatic hypertensive	3	Therapeutic abortion	0	Lived	--	B.P. 160/110, Grade 2 eye ground changes
	41	iii	v	RBBB		3	Therapeutic abortion	+	Lived	--	B.P. 240/130, Grade 3 eye ground changes
5	32	ii	iii	RBBB	Rheumatic	4	Cesarean section	0	Died	Died	Auricular fibrillation and failure fifth month. Cesarean section seventh month. Mother died, had multiple emboli and failure. Baby died
6	24	ii	iii	LBBB	Rheumatic	1	Vaginal	0	Lived	Lived	Uneventful pregnancy
7	40	ii	iii	WPW	Undetermined	1	Vaginal	0	Lived	Lived	Uneventful twin pregnancy

*Key to abbreviations:
LBBB, Left bundle branch block.
RBBB, Right bundle branch block.
WPW, Wolff, Parkinson, White.

Experiences at the New York Lying-In Hospital: There have been 7 cases of bundle branch block at the New York Lying-In Hospital. The relevant data are summarized in Table VIII.

Comment: Bundle branch block represents defective conduction below bifurcation of the auriculoventricular bundle. The impaired conduction may manifest itself in either the right or left branch, or in any subdivision of the intraventricular conduction system. Left block was formerly thought to be more common than right, but recent experiences have shown the reverse to be true. The terms partial bundle branch block, arborization block, and complete bundle branch block have been used in an attempt to localize the site and extent of the lesion, but electrocardiographic and pathologic studies have not furnished sound correlations. All of these abnormalities are now considered as evidence of impaired ventricular muscle, and not as distinct lesions of the conduction system. Since bundle branch block usually occurs with normal sinus rhythm, diagnosis is made by observing the QRS complex over 0.10 second. Its presence, however, may be suspected clinically with diastolic gallop rhythm, reduplicated apex impulse, or pulsus alternans. Although the lesion usually denotes myocardial pathology, it may occur in patients with no other evidence of cardiac disease. Left bundle branch block is more often associated with organic heart conditions, and is accordingly considered to have a worse prognosis than right bundle branch block, although there are exceptions in either case. The lesion itself does not create specific clinical problems, nor does it require definitive treatment.

Functional bundle branch block, as described by Wolff, Parkinson, and White,[38] represents a condition with prolonged QRS and short P-R interval (0.10 second or less), in which the cardiac impulse was thought to follow a circuitous route through the bundle of Kent, by-passing the normal auriculoventricular bundle route. Prinzmetal[62] has recently demonstrated that this syndrome represents a physiologic disturbance along normal pathways. Patients with this syndrome do not usually have organic heart disease and carry on normally, except for attacks of tachycardia, which may be controlled with quinidine, atropine, exercise, or vagal stimulation.

TABLE IX. BUNDLE BRANCH BLOCK IN PREGNANCY. SUMMARY OF 23 CASES

Total cases		23	
Cardiac failure		11	48%
No cardiac problems		12	52%
Maternal deaths		5	22%
Cardiac	4		
Obstetric	1		
Fetal loss		10	43%
Therapeutic abortion	6		
Hysterectomy	1		
Premature cesarean	1		
Vaginal delivery	1		
Undelivered	1		
Delivery			
Therapeutic abortion	6		
Hysterectomy	1		
Cesarean section	4		
Vaginal	12		
Undelivered	1		

Although bundle branch block is not uncommon in general practice, obstetric experience with this lesion is limited. Table IX summarizes the experiences including the 16 cases from the literature and the 7 cases from New York

Lying-In Hospital. Implications derived from the electrocardiographic report have caused considerable anxiety, even in the absence of other cardiac findings. It is apparent, however, that bundle branch block per se does not alter the outcome of pregnancy. Where there is associated cardiac impairment, obstetric management should be determined by accepted concepts related to the underlying heart disease. Four of the 5 deaths were due to advanced heart disease. Although 11 (48 per cent) of the 23 patients developed heart failure, again this was associated with serious cardiac disease, and 12 patients without serious incapacity presented no problems in medical or obstetric management. Two of our patients with right bundle branch block (Cases 4 and 5) had serious heart disease, but another of our patients (Case 2) with similar block did not have significant incapacity. None of our 3 patients with left bundle branch block experienced difficulties. The series is too small to permit definite conclusions, but the data do not support the contention that left bundle branch block is necessarily worse than right.

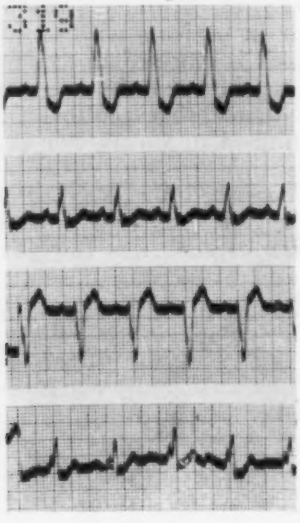


Fig. 6.

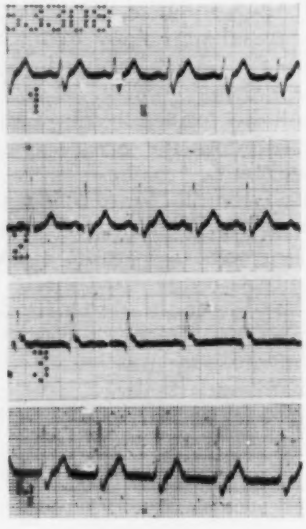


Fig. 7.

Fig. 6.—Case 1 of bundle branch block. Left bundle branch block with QRS of 0.14 second. No significant cardiac difficulty.

Fig. 7.—Case 2 of bundle branch block. Right bundle branch block with QRS of 0.14 second. No significant cardiac difficulty.

Bundle branch block per se has no special implications regarding type of delivery. Serious underlying heart disease constitutes a valid indication for therapeutic abortion. Hysterectomy in our Case 3 was performed because of hemorrhage, associated with multiple uterine fibroids. The uterus contained a blighted ovum. Rheumatic heart disease is not an indication for hysterectomy, hysterotomy, cesarean section, or premature induction of labor, and there is no reason to suggest that associated bundle branch block alters the situation. The hazards of abdominal delivery in the presence of chronic auricular fibrillation are discussed in the section dealing with this arrhythmia. Although the 43 per cent fetal mortality appears high, 7 of the 10 losses were due to obstetric intervention indicated by underlying heart disease.

Tubal sterilization in our Case 4 was performed on medical indications apart from the bundle branch block. This procedure in our Case 2 was performed solely because of the grave prognosis implied by the electrocardiogram. In retrospect, it hardly seems justified.

Fig. 6 illustrates left bundle branch block in Case 1; and Fig. 7 illustrates right bundle branch block in Case 2. Fig. 8 illustrates the Wolff, Parkinson, White type of block in Case 7. None of these patients experienced significant cardiac difficulty.

Disturbances Due to Ectopic Beats

Premature Contractions.—

The earlier obstetric literature contains numerous papers relating to extrasystoles in pregnancy. Jensen[4] reviewed the subject and concluded that, although both pregnancy and the puerperium increased the tendency to premature contractions, the relation had been imperfectly studied. Hamilton and Thomson[1] observed that some women are aware of premature contractions only during pregnancy.

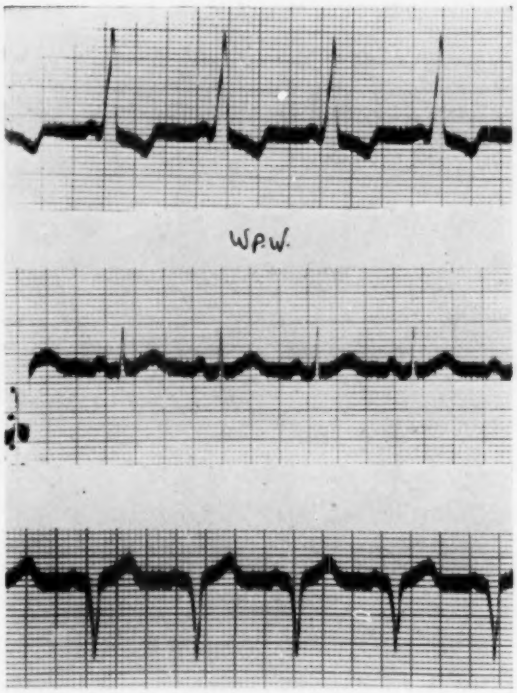


Fig. 8.—Wolff-Parkinson-White syndrome in Case 7 of bundle branch block. P-R interval 0.09 second, QRS 0.12 second. No cardiac symptoms.

We have made no special study of extrasystoles at the New York Lying-In Hospital, but have observed that patients who are conscious of these ectopic beats report increased symptoms throughout the antepartum course and the puerperium.

Premature beats may originate in the auricles, auriculoventricular node, or the ventricles. The exact origin is generally determined by the electrocardiogram. Although extrasystoles occur in patients with organic heart disease, they are also commonly encountered in otherwise normal individuals. Palpitation and apprehension are the main symptoms if the patient is at all conscious of the disturbance. Auricular extrasystoles are more common in patients with paroxysmal auricular tachycardia, auricular flutter, and auricular fibrillation, and may, in fact, shed light on the origin of suspected paroxysms. Although the true cause of extrasystoles frequently remains unrecognized, tobacco, coffee,

and emotional factors are often implicated. Ventricular extrasystoles may be due to digitalis effect. Occasionally, these premature contractions may come every second beat (bigeminy, Fig. 9) or every third beat (trigeminy).

Since premature contractions do not seriously impair the circulation and do not usually signify heart disease, treatment is generally unnecessary. Therapy may be required if palpitations become very disturbing, in which instance barbiturates, quinidine, and digitalis have been useful. The latter drug is reserved for supraventricular extrasystoles, since it tends to increase ventricular irritability and may itself cause such premature contractions.

Premature contractions have no special obstetric significance. The patient who is disturbed by their presence usually has to be reassured that there is no serious cardiac implication.

TABLE X. SUPRAVENTRICULAR PAROXYSMAL TACHYCARDIA. SUMMARY OF 82 CASES

AUTHOR	CASES	HEART DISEASE	HEART FAILURE	DEATHS
Jensen[4]	19	8	4	2
Campbell, Elliott[39]	7	4	1	1
Jensen, Wegner[64]	3	3	0	0
Hamilton, Thomson[1]	14	13	1	1
Browning, Clark[40]	2	0	0	0
Putz, Ullrich[65]	1	0	0	0
Winzeler[66]	1	0	0	0
Weyler, Dustin[41]	1	0	1	0
Lian, Golblin[42]	1	0	0	0
Vander Veer, Kuo[43]	6	2	0	0
Abbas, Guild[44]	1	0	0	0
Szekely, Snaith[45]	10	6	3	0
Mendelson	16	8	2	0
Total	82	44	12	4
Per cent		54	15	5

Paroxysmal Tachycardia.—

Paroxysmal tachycardia has received moderate attention in the obstetric literature. Jensen[4] collected 19 cases up to 1938 which had been recorded in such a manner as to leave the diagnosis beyond reasonable doubt. These and subsequent reports, plus 16 cases from New York Lying-In Hospital, are summarized in Table X. Most authors have noted an increased susceptibility to this complication during pregnancy. Some patients experience their first known attack while gravid. Those with a previous history of paroxysms usually note increased frequency, duration, and severity of episodes, although exceptional cases seem to enjoy a temporary gestatory immunity.

Paroxysmal ventricular tachycardia during pregnancy has been referred to only twice. Mackensie[46] mentions a doubtful case. McMillan and Bellett[47] published the electrocardiographic findings in a definite case, in which the attacks developed late in pregnancy. The patient was delivered by cesarean section during a paroxysm.

New York Lying-In Hospital experiences: A satisfactory diagnosis of paroxysmal tachycardia has been made in 16 patients at the New York Lying-In Hospital. All cases were of the supraventricular variety. The data on these patients are analyzed in Table XI.

Electrocardiograms in 9 patients revealed the ectopic site to be auricular in 6 and nodal in 3. Fig. 10 illustrates auricular tachycardia in Case 10, and Fig. 11, nodal tachycardia in Case 8. There was no instance of associated auriculoventricular block. Eight patients showed no evidence of organic heart

disease, 6 had rheumatic heart disease (functional Class 2—three cases, functional Class 3—three cases). One had hypertensive cardiovascular disease (Class 3), and 1 had kyphoscoliotic heart disease (Class 1). A definite history of similar previous attacks in the nonpregnant state was obtained in only 3 patients. Paroxysmal tachycardia occurred ante partum in 12 patients, intra partum in 5 patients, and post partum in 2 patients. Antepartum attacks recurred with successive pregnancies in each of the 3 patients seen in subsequent confinements. In all but 2 of the patients with antepartum attacks, these began in the last trimester of pregnancy. One of these 2 had her only attacks following operation for intestinal obstruction at 16 weeks; the other had attacks throughout pregnancy, increasing in frequency toward term. Attacks initially appeared intra partum in 3 patients, and post partum in 1 patient. The latter was associated with a pulmonary embolism. Only 1 patient had paroxysms ante partum, intra partum, and post partum. All 3 patients with history of paroxysms in the nonpregnant state suffered attacks during pregnancy (ante partum only).

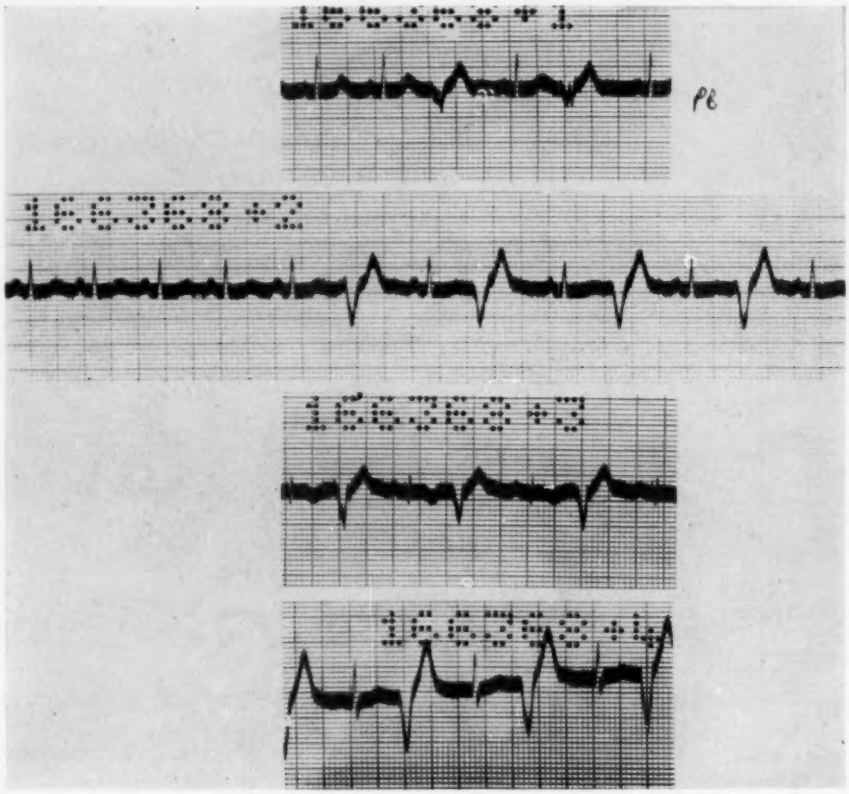


Fig. 9.—Premature contractions with bigeminy. No cardiac symptoms except for palpitations.

Therapy was employed in the 22 observed pregnancies as follows: digitalis 8 times, quinidine twice, digitalis and quinidine once, digitalis and Pronestyl once, phenobarbital once. In 9 pregnancies no therapy was required.

Cardiac failure occurred twice, both times with intrapartum tachycardia in patients with serious organic heart disease (hypertensive cardiovascular Class 3 and rheumatic Class 3). Decompensation had never occurred previously in either of these patients.

TABLE XI. SUPRAVENTRICULAR PAROXYSMAL TACHYCARDIA—NEW YORK LYING-IN HOSPITAL

CASE	AGE	PARITY	GRAVIDITY	HEART DISEASE	FUNCTIONAL CLASS	ATTACKS				THERAPY	DELIVERY	MOTHER	BABY
						NON-PREGNANT	ANTE PARTUM	INTRA PARTUM	POST PARTUM				
1	36	i	ii	Kyphoscoliotic	1	0	0	+	0	0	Vaginal	Lived	Lived
2	32	0	i	Hypertensive	3	0	+	+	0	Digitalis	Vaginal	Lived	Died
	33	i	ii	Hypertensive	3	0	+	+	0	Digitalis	Vaginal	Lived	Lived
	34	ii	iii	Hypertensive	3-4	0	+	+	0	Digitalis	Vaginal	Lived	Lived
3	23	0	i	None		0	+	0	0	0	Vaginal	Lived	Lived
	25	i	ii	None		0	+	0	0	0	Vaginal	Lived	Lived
4	35	0	i	Rheumatic	3	+	+			Digitalis	Therapeutic abortion	Lived	--
5	32	i	ii	None		+	+	0	0	0	Vaginal	Lived	Lived
6	20	0	i	None		0	0	0	+	0	Cesarean section	Lived	Lived
7	28	0	ii	None		0	+	0	0	Phenobarbital	Vaginal	Lived	Lived
	29	i	iii	None		0	0	0	0	0	Vaginal	Lived	Lived
8	35	iii	iv	None		+	+	0	0	Digitalis, quinidine	Vaginal	Lived	Lived
9	40	vii	viii	Rheumatic	2	0	+	0	0	Digitalis, Pronestyl	Vaginal	Lived	Died
10	37	iii	v	Rheumatic	2	0	+	0	0	Digitalis	Vaginal	Lived	Lived
11	30	0	i	None		0	0	+	+	0	Vaginal	Lived	Lived
	32	i	ii	None		0	+	+	+	Quinidine	Cesarean section	Lived	Lived
	35	ii	iii	None		0	+	0	0	Quinidine	Vaginal	Lived	Lived
12	27	i	ii	None		0	0	+	0	0	Vaginal	Lived	Lived
13	33	0	i	Rheumatic	3	0	+	0	0	Digitalis	Vaginal	Lived	Lived
14	19	i	iii	Rheumatic	3-4	0	0	+	0	Digitalis	Vaginal	Lived	Lived
15	26	ii	iii	Rheumatic	2	0	+	0	0	Digitalis	Vaginal	Lived	Lived
16	34	i	ii	None		0	+	0	0	0	Vaginal	Lived	Lived

Both cesarean sections were performed on purely obstetric indications, 1 for placenta previa, and 1 for huge vulvar and vaginal varicosities. The one therapeutic abortion was performed because of advanced rheumatic valvular disease (Class 3).

All 16 patients survived. The 3 fetal losses were unrelated to the paroxysmal tachycardia. One was due to therapeutic abortion. One baby was born macerated (the mother had hypertensive cardiovascular disease and marked placental infarction). The other baby lost was a congenitally microcephalic infant with evidence of Mongolism.

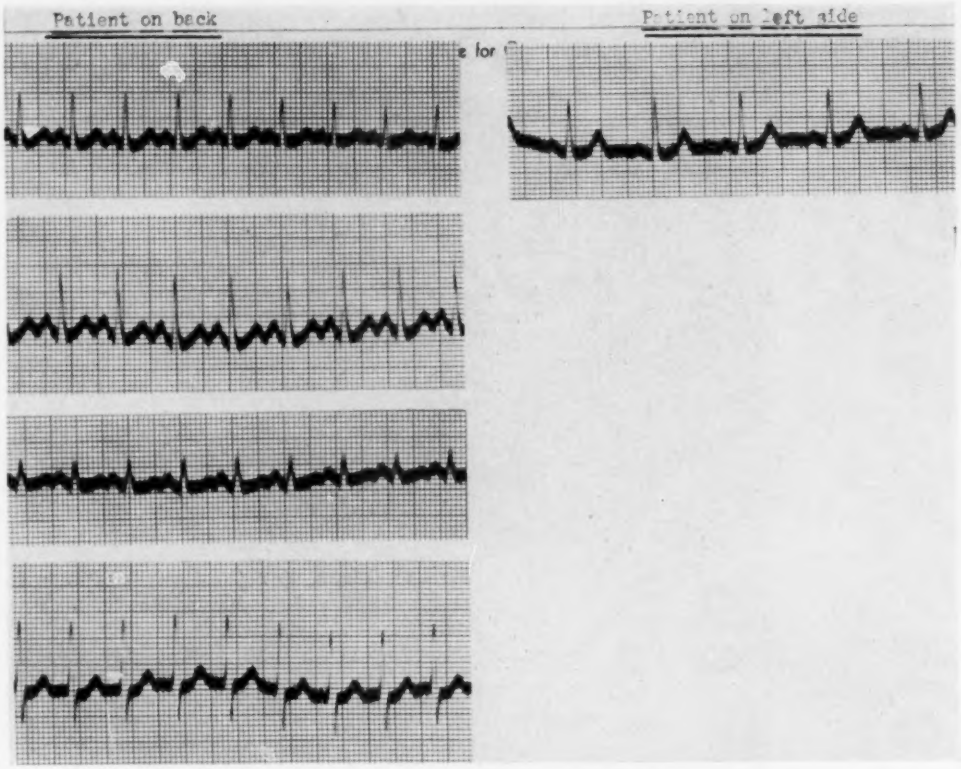


Fig. 10.—Paroxysmal auricular tachycardia in Case 10. Rate 136 per minute with change in position causing return to normal. Onset of attacks in last trimester. No evidence of decompensation.

Comment.—Paroxysmal supraventricular tachycardia is seen in patients without structural heart damage, but it also occurs as a complication of organic heart disease. The attacks are characterized by perfect regularity of rhythm, with a virtually instantaneous onset and cessation. They may be precipitated by a variety of specific factors, although frequently no obvious cause may be elicited. The symptoms are variable, but palpitation, dyspnea, syncope, apprehension, nausea, vomiting, and angina may occur. The over-all effect on the patient depends on the cardiac status, duration of the attack, and heart rate during the paroxysm. The heart rate ranges from about 150 to 250 per minute, although slower rates may occur. Cardiac failure may supervene, especially if there is pre-existing structural heart damage. Therapy is directed toward stopping the attack, and preventing new ones from developing. Accepted

methods of treatment include carotid or eyeball pressure, Valsalva maneuvers, induction of gag reflex, or use of various drugs. The digitalis preparations are most commonly employed, but quinidine, procaine amide, Mecholyl, Prostigmin, magnesium sulfate, Neo-Synephrine, and various sedatives have also been used. Varying degrees of auriculoventricular block accompanying the paroxysms have occasionally been reported. Premature auricular contractions are frequently observed between the attacks.

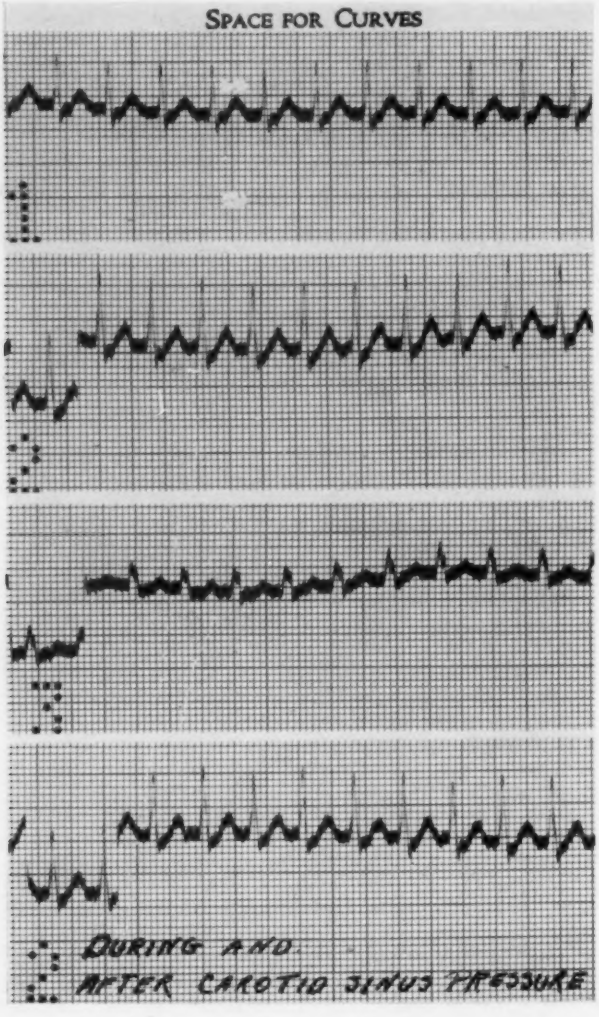
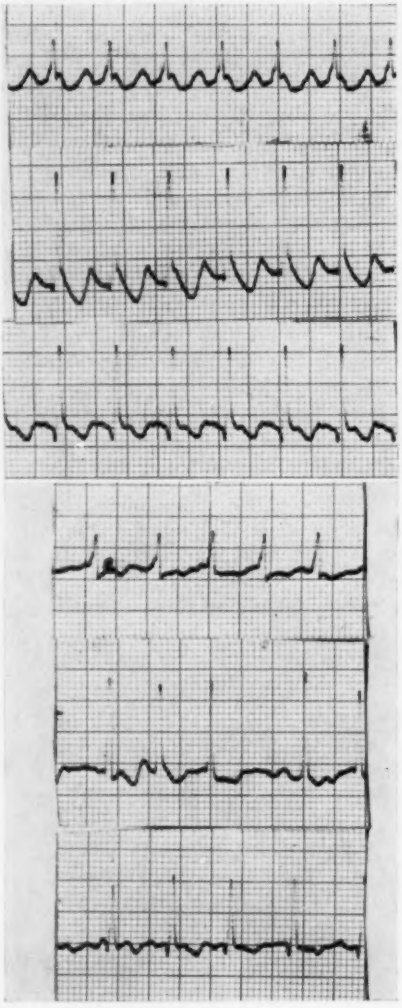


Fig. 11.—Paroxysmal auriculoventricular (nodal) tachycardia in Case 8. Rate 187 per minute. Carotid sinus pressure caused no significant change. Attacks throughout pregnancy increasing in the last trimester. No evidence of decompensation.

The reports in the literature and the experiences at New York Lying-In Hospital indicate that pregnancy tends to increase susceptibility to supraventricular paroxysmal tachycardia. This increased susceptibility becomes more evident late in pregnancy and during labor, suggesting that vagal influences may be created by diaphragmatic pressure. In the absence of structural heart damage this type of paroxysmal tachycardia does not ordinarily alter the normal course of pregnancy, and there is no significant maternal hazard. If organic

heart disease is present, however, cardiac failure may be precipitated, and death may occur. Lian and associates[42] observed that the fetus may be compromised by anoxia accompanying intrapartum attacks. It therefore becomes most important to prevent these attacks if possible, or to abolish them promptly when they occur. Oxygen should be administered to the mother if paroxysmal tachycardia occurs during labor.

A.



B.

Fig. 12.—Transient auricular flutter with a 2 to 1 block in a patient with Graves' disease, showing change to auricular fibrillation prior to reversion to normal rhythm.

The pregnant state need not alter conventional treatment of paroxysmal supraventricular tachycardia. Damage to the eighth nerve of the fetus has been reported following use of quinine and its derivatives, but with much larger doses than are ordinarily employed in treating ectopic rhythms, and there is ample evidence to show that quinidine does not significantly affect the uterine musculature. Conversely, there is no reason to deviate from accepted obstetric concepts because of the paroxysmal tachycardia. Underlying heart disease should

determine indications for interruption of pregnancy, and the method of delivery should be decided on purely obstetric principles. Paroxysmal tachycardia, like sinus tachycardia, occurring during the first, second, or third stage of labor, may indeed be both confusing and alarming, but with correct diagnosis and appropriate therapy the situation can usually be adequately controlled.

Paroxysmal ventricular tachycardia in pregnancy has been reported only twice. Unlike the supraventricular type, it is more often seen with serious cardiac conditions, particularly coronary artery disease, and the accompanying rate is slower with slight irregularities. Vagal stimulation has no effect on ventricular tachycardia. Quinidine is specific, but procaine amide has also been useful. Digitalis is contraindicated, because it increases ventricular irritability. Despite the very limited experience, there is no reason to suggest that ventricular paroxysmal tachycardia should alter accepted medical or obstetric concepts relating to heart disease in pregnancy, and gestation can scarcely be considered to predispose to this ectopic disturbance.

Auricular Flutter.—

Auricular flutter is a very uncommon complication of pregnancy. Thomas[48] described a case in which flutter was converted to fibrillation, and, although cardiac failure occurred, the patient survived pregnancy and vaginal delivery. Herrick[49] reported transient flutter following vaginal delivery in a patient without organic heart disease. Naish[50] mentioned a case of transient flutter accompanied by congestive failure in another patient delivered vaginally. Hamilton and Thomson[1] referred to a patient with congenital heart disease and untreated flutter, who had led a normal life and successfully gone through two uneventful pregnancies.

We have seen one patient with transient auricular flutter (Fig. 12) accompanying Graves' disease. The rhythm changed to auricular fibrillation, and then reverted spontaneously to normal sinus rhythm with control of the hyperthyroidism. There were no maternal or fetal complications.

With auricular flutter the auricular rate is generally between 200 and 350, but since there is usually some degree of auriculoventricular block, the ventricular rate is lower. The rapid regular heart rate must be distinguished from that of sinus tachycardia and of auricular tachycardia. If, for example, the pulse rate is 200 or more, auricular tachycardia is most likely, since normal tachycardia seldom reaches such a high level, and flutter would imply an auricular rate of 400 or 200. A rate of 400 (with a 2 to 1 block) is too rapid for flutter, and a rate of 200 is relatively slow and would signify complete auriculoventricular conduction which rarely occurs. Vagal stimulation may aid in the differential diagnosis: paroxysmal supraventricular tachycardia may be completely abolished; the ventricular rate may be slowed in both flutter and sinus tachycardia, but in flutter the rate is apt to change quite suddenly if various degrees of block are created, and auricular waves can often be detected in the jugular pulse.

Auricular flutter is usually associated with organic heart disease, but may occur in otherwise normal hearts. It may develop transiently in the form of paroxysms, but, unless treated, generally tends to establish itself and remain permanently. Therapy is directed toward restoration of normal rhythm or control of the ventricular rate. Digitalis and quinidine are used.

The rarity with which auricular flutter has been encountered during pregnancy speaks against increased susceptibility by virtue of the gestatory state. Pregnancy should not alter the medical aspects of this complication. It has been pointed out in the section dealing with paroxysmal tachycardia that quinidine and its derivatives are not contraindicated in pregnancy. The limited recorded

experience does not suggest that auricular flutter per se has special obstetric implications. Although congestive failure may develop in the presence of organic heart disease, accepted concepts relating to underlying heart disease should be followed.

Auricular Fibrillation.—

Literature: Mackensie[51] was the first to identify auricular fibrillation, and in 1904 he described it as a contraindication to pregnancy. McVeagh,[52] in 1867, and Ollivier,[53] in 1869, had reported unusual cases during pregnancy, which probably represent instances of auricular fibrillation. Jensen[4, 64] commented upon the rarity of this complication in pregnant women, having seen it personally only twice. Until quite recently, most authors have shared the pessimistic attitude that auricular fibrillation is a formidable complication which precludes successful childbearing. Hamilton and Thomson[1] concluded that these cases were bad pregnancy risks. Bramwell and Longson[54] observed that it was sometimes justifiable to allow pregnancy to continue under adequate supervision. Jones[55] stated, "Although the presence of auricular fibrillation indicates heart disease of some severity, other factors such as capacity for effort, and heart failure, are important prognostic features. If the outlook is favorable in these respects, one should not be unduly intimidated by the presence of auricular fibrillation, and pregnancy may be considered, provided the patient is aware of the risk, is intelligent and cooperative, and adequate facilities for supervision are available." Snaith and Szekely[26] came to essentially similar conclusions to those of Jones.

New York Lying-In Hospital experiences: We have seen 10 patients with transient auricular fibrillation. Twenty-one patients had chronic auricular fibrillation for at least one year prior to pregnancy.

Transient auricular fibrillation: Two patients had transient auricular fibrillation associated with Graves' disease. Reversion to normal rhythm occurred following control of the hyperthyroidism, and there were no maternal or fetal complications.

Eight patients, (Table XII) with rheumatic heart disease had transient auricular fibrillation following antepartum mitral commissurotomy. The average age was 32 years; one was a primigravida, and 7 were multigravidas. All had pure mitral stenosis with a valvular orifice measuring 1 sq. cm. or less, and decompensation had been present in all prior to operation. None showed clinical evidence of rheumatic activity, although two had Aschoff bodies in histologic sections of the auricular appendage. In each case the rhythm reverted to normal with digitalis and/or quinidine. One patient miscarried three weeks following operation. Another patient delivered prematurely three months after operation. This baby weighed 1,070 grams and died of prematurity. Six patients delivered normal term babies which survived. One was delivered abdominally because of obstetric indications (contracted pelvis and previous cesarean section), and 5 were delivered vaginally. One of the latter 5 had another transient episode of fibrillation post partum and a pulmonary embolism, but she recovered completely. There were no other complications, and all 8 mothers survived. Puerperal tubal sterilization was performed in one instance.

Chronic auricular fibrillation: Twenty-one patients (Table XIII) had chronic auricular fibrillation associated with rheumatic heart disease. The average age was 33 years; 4 were primigravidas, and 17 were multigravidas. Seventeen had pure mitral involvement; 3 had mitral and aortic involvement, and one had mitral and tricuspid involvement. All 21 received digitalis.

The functional classifications according to the criteria of the New York Heart Association were: Class 1—no cases, Class 2—two cases, Class 3—five cases, and Class 4—fourteen cases. Eleven Class 4 patients had been Class 3

TABLE XII. TRANSIENT AURICULAR

CASE	AGE	PARITY	GRAVIDITY	LESION	WEEK OF FAILURE	WEEK OF OPERATION	MITRAL VALVE 1 SQ. CM. OR LESS	ASCHOFF BODIES	DIGITALIS
1	40	iii	iv	Mitral stenosis	16	18	+	+	+
2	24	0	i	Mitral stenosis	16	17	+	0	+
3	32	i	ii	Mitral stenosis	16	17	+	0	+
4	39	ii	v	Mitral stenosis	19	20	+	0	+
5	27	i	ii	Mitral stenosis	14	16	+	0	+
6	35	v	vi	Mitral stenosis	18	20	+	0	+
7	26	i	ii	Mitral stenosis	18	21	+	0	+
8	30	i	ii	Mitral stenosis	14	18	+	+	+

when first seen during pregnancy. Three Class 4 patients had also become decompensated in a previous pregnancy. The 14 instances of cardiac failure occurred as follows: 5 in the second month, 4 in the fifth month, 2 in the sixth month, 2 in the seventh month, and one in the eighth month. Decompensation recurred intra partum in one patient who delivered prematurely at 36 weeks. Decompensation recurred post partum in 3 patients; one after therapeutic abortion, and 2 after cesarean section. These 3 patients also suffered multiple emboli and died.

One patient died undelivered. One patient aborted spontaneously and survived. Seven patients had a vaginal therapeutic abortion. Five of these were in Class 4, and 2 were in Class 3; one died and 6 survived. Five patients were delivered by cesarean section. Two of these suffered multiple emboli and died in cardiac failure; 3 survived without further complications. Seven patients were delivered vaginally at or near term. One of these, who had suffered an antepartum embolism, had another post partum. The remaining patients were free of further complications, and all 7 survived.

Five patients (23 per cent) had embolic complications occurring for the first time. Case 20 is of particular interest.

This was a 36-year-old white para i, gravida iii, with a normal pelvis and negative serologic test for syphilis. The past history revealed rheumatic fever in childhood, without subsequent decompensation. Examination showed double mitral and aortic lesions. X-rays indicated left auricular enlargement and some straightening of the left cardiac border. The functional status was adequate, and she was considered to be in Class 2. The patient developed a femoral infarct in the third month, and was maintained on Dicumarol throughout pregnancy and after delivery. Her prothrombin time was kept at about 20 seconds until labor ensued, when vitamin K was administered. After four hours a normal living 3,040 gram infant was delivered by low forceps under pudendal block anesthesia. Episiotomy was performed, and the total measured blood loss was 300 c.c. Dicumarol was resumed immediately post partum. The patient developed a renal infarct on the eleventh postpartum day, but recovered and her functional cardiac status remained unchanged throughout pregnancy, labor, and the puerperium. The infant received vitamin K at birth, and showed no bleeding tendency.

The remaining 4 patients with embolic complications did not receive anticoagulant therapy. One patient suffered emboli after therapeutic abortion, and died in cardiac failure. Two patients developed multiple emboli following

FIBRILLATION FOLLOWING MITRAL COMMISSUROTOMY

QUINIDINE	EMBOLISM	ANTICOAGULANTS	TYPE OF DELIVERY	MONTH OF DELIVERY	TUBAL LIGATION	MOTHER	BABY
0	Post partum	+	Vaginal	9	0	Lived	Lived
+	0	0	Vaginal	9	0	Lived	Lived
0	0	0	Vaginal	7	0	Lived	Died (premature, 1,070 grams)
+	0	0	Cesarean section	9	0	Lived	Lived
0	0	0	Vaginal	9	0	Lived	Lived
0	0	0	Miscarriage	6	0	Lived	Died (574 grams)
0	0	0	Vaginal	9	0	Lived	Lived
+	0	0	Vaginal	9	+	Lived	Lived

cesarean section, and succumbed in a similar manner. The other instance of embolism followed a normal spontaneous delivery at term, and this patient survived.

The 4 deaths indicate a maternal mortality of 19 per cent. The patient who died undelivered was first seen with intractable cardiac failure at the fifth month, and she succumbed one month later. One death followed therapeutic abortion, with subsequent emboli and congestive failure. This patient had also been decompensated in her previous pregnancy. Two similar deaths followed cesarean section.

The total fetal mortality was 11, or 50 per cent. There was one intrauterine death (the mother died undelivered); one spontaneous abortion; 7 therapeutic abortions; and 2 deaths following cesarean section.

Tubal ligation was performed twice after therapeutic abortion, and once at the time of cesarean section. These 3 patients survived without complications.

Comment.—Auricular fibrillation may occur paroxysmally in patients without other evidence of heart disease, as a result of unusual stress or illness such as severe infection, embolism, toxemia, or Graves' disease. These cases are rare, and the cardiac problem is usually not serious. Our 2 cases of auricular fibrillation, first appearing during pregnancy complicated by Graves' disease, reverted to normal sinus rhythm with control of the hyperthyroidism and there were no maternal or fetal complications. When auricular fibrillation appears for the first time, it may be abolished by quinidine, digitalis, or procaine amide.

Auricular fibrillation associated with rheumatic heart disease presents real problems in pregnancy. Although this arrhythmia is encountered in younger rheumatic females, it is usually in connection with clinically active carditis, which is relatively uncommon in the childbearing age. (See section on first-degree heart block.) None of the 8 cases of transient postcommissurotomy auricular fibrillation had clinically recognizable evidence of active carditis. Conversely, we have seen active rheumatic fever 9 times in pregnancy, without auricular fibrillation. Only 2 of the postcommissurotomy cases had Aschoff bodies in histologic sections of the auricular appendage. Auricular fibrillation developing after mitral valvulotomy has, in our experience, been transient. If it did not revert spontaneously, a return to normal sinus rhythm was effected with digitalis and/or quinidine. There was one instance of embolism in this group. One patient miscarried three weeks following cardiac surgery. Another baby

TABLE XIII. CHRONIC AURICULAR

CASE	AGE	PARITY	GRAVIDITY	VALVULAR LESION*	FUNCTIONAL CLASS	PREVIOUS CARDIAC FAILURE	MONTH OF CARDIAC FAILURE THIS PREGNANCY
1	31	i	ii	MIMS	2	0	0
2	27	0	i	MIMS	3	0	0
3	32	0	i	MS	4	+	7
4	31	ii	iv	MIMS	4	0	2
5	34	i	ii	MS	4	0	6
6	31	ii	iii	MS	4	0	6
7	43	iv	v	MS	4	0	5
8	33	i	ii	MIMS	3	0	0
9	22	i	ii	MIMS	4	+	2
10	37	iv	v	MIMS	4	0	7
11	23	0	i	MIMSAI	3	0	0
12	39	iv	v	MIMS	3	0	0
13	36	ii	iii	MIMSAIAS	4	0	2
14	33	v	vii	MIMS	4	0	8
15	40	v	vi	MIMS	3	0	0
16	32	ii	iii	MIMS	4	0	5
17	34	ii	iii	MIMS	4	0	2
18	38	i	ii	MIMS	4	0	5
19	23	0	i	MIMSTITS	4	0	5
20	36	i	iii	MIMSAIAS	2		0
21	37	i	v	MS	4	+	2

*Key to abbreviations:
MI, mitral insufficiency.
MS, mitral stenosis.
AI, aortic insufficiency.
AS, aortic stenosis.
TI, tricuspid insufficiency.
TS, tricuspid stenosis.

was lost with premature delivery some three months after commissurotomy, and any causal relation in this latter instance seems most unlikely. All other patients went to term, delivered normal living infants, and survived. Vaginal delivery occurred in all but one instance, in which cesarean section was performed because of obstetric indications.

The ordinary onset of auricular fibrillation in chronic rheumatic heart disease cannot be prevented. Although there are some who attempt to revert the rhythm in chronic fibrillation, most agree that it is better to control it with digitalis. Chronic auricular fibrillation is not usually encountered until the

FIBRILLATION IN PREGNANCY

DIGITALIS	EMBOLISM	ANTICOAGULANTS	TYPE OF DELIVERY	MONTH OF DELIVERY	TUBAL LIGATION	MOTHER	BABY
+	0	0	Vaginal	9	0	Lived	Lived
+	0	0	Therapeutic abortion	3	+	Lived	–
+	0	0	Vaginal	8	0	Lived	Lived
+	0	0	Therapeutic abortion	2	0	Lived	–
+	Post partum	0	Vaginal	9	0	Lived	Lived
+	0	0	Cesarean section	9	+	Lived	Lived
+	0	0	Cesarean section	9	0	Lived	Lived
+	0	0	Vaginal	9	0	Lived	Lived
+	0	0	Therapeutic abortion	2	0	Lived	–
+	0	0	Cesarean	9	0	Lived	Lived
+	0	0	Vaginal	9	0	Lived	Lived
+	0	0	Therapeutic abortion	2	0	Lived	–
+	0	0	Therapeutic abortion	2	+	Lived	–
+	0	0	Vaginal	9	0	Lived	Lived
+	0	0	Spontaneous abortion	3	0	Lived	–
+	Post partum	0	Cesarean section	7	0	Died	Died
+	Post partum	0	Therapeutic abortion	3	0	Died	–
+	Post partum	0	Cesarean section	6	0	Died	Died
+	0	0	Undelivered	–	–	Died	Died
+	Ante partum, post partum	+	Vaginal	9	0	Lived	Lived
+	0	0	Therapeutic abortion	2	0	Lived	–

patient is relatively old in terms of chronologic age and duration of heart disease. The average age of our patients was 33 years. Many woman die from rheumatic heart disease before they are old enough to develop auricular fibrillation. Although this arrhythmia commonly appears at the end of the rheumatic career, there are those who survive with fibrillation for years.

Patients with chronic auricular fibrillation for the most part represent a badly debilitated group with rheumatic heart disease, irrespective of the arrhythmia. In a previous study we[56] reviewed the management of patients with serious rheumatic heart disease, and showed that the vast majority can be successfully handled and delivered by the vaginal route, if seen early enough to permit adequate prenatal supervision. Vaginal therapeutic abortion, when indicated, is a relatively safe procedure for interruption of early pregnancy. The prenatal hazards, and those of labor and delivery, can be definitely reduced with good antepartum care, including careful functional evaluation, adequate

supportive therapy, and appropriate shortening of the second stage of labor. Intrapartum pulse[2, 3] and respiratory rates provide a valuable guide to the cardiac status. In serious rheumatic heart disease, the duration of pregnancy and of labor, the incidence of spontaneous abortion and of premature labor, the weight of the infants, and the blood loss at delivery are not significantly different from values in normal women. Similar experiences in other clinics, together with an understanding of gestational hemodynamics, have led to the abandonment of radical obstetric interference. Interruption of pregnancy by hysterectomy, hysterotomy, induction of labor, or cesarean section is no longer employed, and patients are allowed to proceed to term, anticipating the physiologic decrease in circulatory burden and the more efficient spontaneous labor.

Some authors[57] even categorically state that therapeutic abortion is no longer indicated in rheumatic heart disease. Statistics have indicated that the average age at death in men and women (nulliparous and parous) with rheumatic heart disease is identical. From these data it has been erroneonsuly concluded that maternal deaths from rheumatic heart disease are due to the natural course of cardiac disease, and that the circulatory burdens imposed upon a woman by the pregnant state are no greater than other burdens she might normally encounter during a comparable 9 month, nongravid span of time. If maternal deaths represent the natural evolution of rheumatic heart disease, deaths should be evenly distributed throughout pregnancy. However, we[59] have clearly shown that the vast majority of cardiac failures and deaths occur at the height of the hemodynamic burden of pregnancy, and it is this burden, rather than the natural course of rheumatic heart disease, which accounts for maternal deaths. We are unable to accept the observations of Gorenberg and Chesley[57] suggesting that longevity is greatest in those patients with the most serious cardiac disability who bear the largest number of children.

Auricular fibrillation brings added risks of embolism, tends to impair the circulation and produce heart failure in an already damaged heart. Any obstetric complication which yields a 19 per cent maternal and 58 per cent fetal mortality deserves very special consideration. Recent developments in medicine and surgery have fortunately given cause for a brighter outlook, and there is promise of future improvement. Anticoagulant drugs have lessened the dangers of embolism. Thrombi have been removed surgically, and valvular competence has been restored with dramatic improvement in myocardial function.

Anticoagulant drugs have been successfully administered for various conditions during pregnancy.[58] These drugs pass through the placenta, and hypoprothrombinemia with hemorrhage has occasionally been reported in the newborn. If these agents are administered to pregnant women, especially those approaching term, considerable caution should be exercised to avoid hemorrhage in the mother and infant. We have used prothrombin values not exceeding 20 seconds, and once labor has started, we have withheld anticoagulants and administered vitamin K. Vitamin K should be given to the infant and nursing not allowed, at least not until the mother's plasma prothrombin activity has returned to normal if therapy is not resumed. Most patients in the chronic fibrillation series were cared for prior to the clinical use of anticoagulant drugs, and only Case 20 received such therapy. The 23 per cent incidence of embolism suggests that prophylactic therapy should be given, unless specific contraindications exist. Some authors advocate similar prophylactic treatment in rheumatic heart disease with normal sinus rhythm, but we have not been impressed with the danger of embolism in the absence of chronic auricular fibrillation.

We[59] have previously shown that mitral valvulotomy can be successfully performed ante partum, and that pregnancy does not increase the operative mortality of commissurotomy or the incidence of premature labor. In fact, the

recorded experiences indicate that mitral valvulotomy, prior to and during pregnancy, favorably influences maternal and fetal mortality, and decreases the need for therapeutic abortion. Most cases in the chronic fibrillation group were cared for prior to the introduction of mitral surgery, and only one patient (Case 21) was considered as a candidate for commissurotomy. Operation was refused, and therapeutic abortion was performed. Autopsy examination of the heart in Case 19 revealed a pinpoint opening of the mitral orifice which could have been opened by valvulotomy. Undoubtedly other patients in this group would have been suitable candidates for operation. Future refinements in cardiac surgery may bring other valvular lesions to operative revision.

TABLE XIV. CHRONIC AURICULAR FIBRILLATION IN PREGNANCY. SUMMARY OF 88 CASES

AUTHOR	CASES	DIED UNDELIVERED	SPONTANEOUS ABORTION OR MISCARRIAGE	THERAPEUTIC ABORTION	HYSTERECTOMY	HYSTEROTOMY	CESAREAN SECTION	VAGINAL DELIVERY	CARDIAC FAILURE	DEATHS
Hamilton and Thomson	18	3			4	9		2	16	6
Bramwell and Longson	17	4		8				5	3	4
Jones	19	1	3	6			1	8	7	1
Snaith and Szekely	13	1		1				11	3	2
Mendelson	21	1	1	7			5	7	14	4
Total	88	10	4	22	4	9	6	33	43	17
Per cent		11	5	25	5	10	7	38	50	19

Table XIV summarizes the experiences in 88 patients, including 67 gathered from the reports in the literature where details were available, and our 21 cases. Each patient with chronic auricular fibrillation must be carefully individualized. There are patients with relatively slight functional impairment, who may reasonably be expected to tolerate the burden of pregnancy. Our 2 Class 2 cases presented no problems in compensation, although one did develop embolic complications which were successfully managed, as described. It would have been a mistake to interrupt these pregnancies solely on the basis of the arrhythmia. Management of patients with greater incapacity will vary. The cardiac reserve may be so limited that no amount of rest and supportive care will compensate for the circulatory load of pregnancy, especially hypervolemia. Ten patients (11 per cent) of the total 88 died undelivered. Some patients will be suitable candidates for mitral commissurotomy, but, if cardiac surgery has nothing to offer, early pregnancy should be interrupted by vaginal therapeutic abortion, preferably under local anesthesia. Whereas this is a relatively safe procedure with normal sinus rhythm, it is not without some risk in fibrillation, as indicated by the death in our series. Prophylactic anticoagulant therapy might perhaps have altered the fatal outcome, but any operative procedure in the presence of auricular fibrillation carries added risks of embolism. If cardiac surgery or vaginal interruption is neither feasible nor acceptable, all the recorded experiences definitely show that later obstetric intervention intended as cardiac therapy is contraindicated. Table XV shows that hysterectomy, hysterotomy, and cesarean section each has a definitely higher mortality than vaginal delivery. Premature induction of labor is also dangerous. Supportive measures must be relied upon, in anticipation of late physiologic decrease in the circulatory burden of pregnancy. The duration of labor, the weight of the babies, and the blood loss at delivery in our 7 cases did not differ from average values in normal patients.

Most reports in the literature omit discussion of fetal mortality. The total fetal mortality in the 88 cases was 51 (58 per cent). Ten of these losses were associated with antepartum death of the mother, 4 (5 per cent) were due to spontaneous abortion or miscarriage, and the remainder resulted from obstetric intervention. The relatively low incidence of spontaneous abortion and miscarriage gives no support to the popular notion that patients with chronic auricular fibrillation usually solve their own problem in this fashion. Premature labor occurred only once and was not a cause of fetal death. Postmortem cesarean section should always be performed with antepartum death of the mother if the baby is viable.

TABLE XV. CHRONIC AURICULAR FIBRILLATION IN PREGNANCY. MORTALITY ACCORDING TO TYPE OF DELIVERY IN 78 CASES

DELIVERY	CASES	DEATHS	PER CENT
Spontaneous abortion or miscarriage	4	0	0
Therapeutic abortion	22	1	5
Hysterectomy	4	1	25
Hysterotomy	9	1	11
Cesarean section	6	2	33
Vaginal delivery	33	2	6

Tubal ligation in our series was performed twice following therapeutic abortion, and once at the time of cesarean section. We have not encountered complications due to this procedure, but we realize that patients have in the past been sterilized because of severe mitral stenosis, who today, with cardiac surgery, might successfully carry through pregnancy. If prophylactic anticoagulant therapy is employed as advocated above, laparotomy for tubal ligation would be inadvisable under these conditions. The inherent risks of surgery in patients with chronic auricular fibrillation must also be reckoned with. We prefer to offer contraceptive advice where indicated.

Subacute bacterial endocarditis[60] has followed antepartum, intrapartum, and postpartum infection in patients with rheumatic heart disease. We give prophylactic antibiotic therapy to all our rheumatic cardiac patients, and have not encountered this complication in patients with auricular fibrillation. The increased incidence of mastitis, and the fluid demands necessary for adequate milk supply have led us to discourage breast feeding in patients with rheumatic heart disease.

Escaped Beats: One or more beats may arise from aberrant centers when the sinus impulse is delayed. Stimuli may originate in the auriculoventricular node, the bundle of His, or lower tissues. This phenomenon may occur in normal patients and those with carotid sinus hypersensitivity. Symptoms are generally absent and no treatment is necessary. This disturbance has not been reported during pregnancy.

Pulsus Alternans.—

Hamilton and Thomson[1] state they have seen persistent pulsus alternans in one case of rheumatic heart disease, and several cases of hypertensive disease complicated by toxemia. They also mention patients with apparently normal hearts, who had transient pulsus alternans with illness or long labor. Details were not recorded. We have not found other references to this disturbance in pregnant women.

Pulsus alternans has been observed in 4 patients at the New York Lying-In Hospital. It occurred twice as a transient manifestation with antepartum paroxysms of supraventricular tachycardia in patients without cardiac disease, who went through pregnancy and vaginal delivery free of other complications.

It was also noted twice in patients with organic heart disease; one patient died ante partum following coronary occlusion, and another had residual myocardial damage following idiopathic myocarditis. The latter patient went through pregnancy and vaginal delivery without serious cardiac difficulty.

Pulsus alternans refers to an alternation in strength of the heartbeat. It must be differentiated from the apparent alternation occurring with bigeminy. There are no electrocardiographic abnormalities with pulsus alternans. When it occurs with normal sinus rhythm, there is usually serious myocardial disease, but it may also be encountered in normal hearts as a transient manifestation with premature contractions or paroxysmal tachycardia. Pulsus alternans should not alter accepted concepts relating to underlying heart disease. It requires no specific treatment.

Summary

Disorders of the heartbeat during pregnancy are discussed in relation to published reports and experiences at the New York Lying-In Hospital. The various disturbances are analyzed in terms of medical and obstetric implications.

Conclusions

Except for ventricular fibrillation, all disorders of the heartbeat described have been observed in patients with otherwise normal hearts, as well as those with organic heart disease.

Evidence suggests that pregnancy may increase susceptibility to premature contractions, sinus tachycardia, and paroxysmal supraventricular tachycardia.

Sinus tachycardia, paroxysmal tachycardia, auricular flutter, and auricular fibrillation may precipitate congestive failure in patients with structural heart damage, and death may result.

None of the disorders of heartbeat per se, in the absence of organic heart disease, constitutes a valid indication for therapeutic abortion, hysterectomy, hysterotomy, induction of labor, cesarean section, or sterilization.

None of the disorders of heartbeat should alter accepted concepts of management related to specific underlying heart disease.

Maternal and fetal mortality associated with these disorders is mainly due to underlying heart disease. Exceptional instances of fetal death may be related to anoxia accompaning intrapartum paroxysmal tachycardia. Postmortem cesarean section should be performed if the mother dies undelivered and the baby is viable.

None of the disorders of heartbeat per se affects the incidence of spontaneous abortion or miscarriage, the duration of pregnancy or of labor, the blood loss at delivery, or the weight and health of the baby.

Not an insignificant number of maternal and fetal deaths have been due to ill-judged obstetric intervention.

Disorders of the heartbeat in pregnancy may produce alarming and confusing symptoms, which should be correctly diagnosed and properly treated. The true nature of tachycardias and syncopal attacks may be discovered if due consideration is given to these disorders.

Quinidine and its derivatives are not contraindicated in pregnancy.

When digitalis and other causes of cardiac damage are excluded, prolonged P-R interval should suggest rheumatic carditis. Nevertheless, conduction time may be prolonged without other evidence of rheumatic activity, and may be normal despite definite active rheumatic fever.

In pregnant women, chorea, chronic auricular fibrillation, and fatal rheumatic heart disease are not usually associated with clinically recognizable carditis or prolonged auriculoventricular conduction.

The physiologic gestatory elaboration of adrenal cortical hormone may account for the extremely low incidence of active rheumatic fever in pregnancy.

Congenital heart block is frequently associated with other congenital cardiac anomalies, particularly intraventricular septal defect.

Auricular fibrillation not associated with organic heart disease, and auricular fibrillation occurring after mitral surgery can usually be reverted to normal sinus rhythm.

Chronic auricular fibrillation associated with rheumatic heart disease is not necessarily incompatible with successful childbearing. The maternal hazards are those of the underlying heart disease, plus increased tendency to embolism and heart failure. Current advances in medicine and cardiac surgery tend to reduce these dangers.

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A TRAINING METHOD FOR CHILDBIRTH UTILIZING HYPNOSIS

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HYPNOSIS is employed currently as an aid to childbirth in about 40 per cent of my total deliveries. Out of this group about one third of the patients go through the entire labor and delivery (including episiotomy, manual exploration of the uterus, examination of the cervix, posterior colporrhaphy) without the use of any drug or anesthetic.

When the patient first expresses an interest in hypnosis she is given a leaflet containing a brief description of the uses of hypnosis in the field of medicine. The common misunderstandings and fallacies of hypnosis are clarified. The patient is oriented, in a general way, as to what she can expect to experience while under hypnosis. Also, she is told just what is expected of her, in order that she may cooperate as a good subject. This leaflet presents information which actually conditions the patient for future trance inductions. In other words, it consists of a series of "prehypnotic" suggestions.

Each patient is given a book to read, such as *Childbirth Without Fear* by Grantly Dick Read, or *Understanding Natural Childbirth* by Herbert Thoms. Also from the *Birth Atlas,* printed by the Maternity Center Association of New York, she is shown by actual pictures the process of fertilization, growth of the embryo and fetus, and finally the normal birth of a baby. In addition she is given physical exercises which include relaxation and breathing techniques for the different stages of labor; stretching of the pelvic floor; posture training; and exercises for figure recovery after delivery. She is told of the changes which occur in the woman's body during pregnancy; some favorable and unfavorable symptoms; the relationship between emotional and physical health; breast feeding and nipple care; etc. If the patient desires, she is taken on a tour of the hospital and shown the labor, delivery, and postpartum rooms, and nursery.

In my experience I have found that it is not necessary to start hypnotic training for childbirth until some time after the sixth month of pregnancy. The first training session is a special thirty to forty-five minute appointment. At this time the patient listens to a tape recording, which of course should be a recording of the physician's own voice. This consists of information similar to that found in the leaflet, plus a head-to-toe method of muscle relaxation. I find that about 50 per cent of the patients experience hypnosis merely listening to this recording. This recording may be repeated once or twice later during the pregnancy. When this is done I find that it markedly deepens the stage of hypnosis.

During the second training period (one half hour) she is taught a simple method of relaxation. The technique may be summarized as follows: First, muscles are places under stress. At a given signal they are released from this stress and simultaneously the attention is detached from the muscles. The effectiveness of this technique in promoting relaxation is shown by the fact that approximately 75 per cent of all patients will spontaneously drift into hypnosis without any other suggestions being given. If suggestions for future hypnotic inductions are given at the end of the exercise, hypnosis can then be induced easily in almost 100 per cent of the patients.

Every patient is taught self-hypnosis, and instructed to use it at least two or three times daily. Also during this session she is given a signal to facilitate future inductions, so that she will fall into hypnosis on command. She is informed that this signal will be effective anywhere, even over the telephone.

A minimum of fifteen to thirty minutes should be allowed for all subsequent hypnotic training periods. Usually a total of five to eight sessions are adequate to train the average good subject. More frequent visits and additional time will be necessary when special problems arise. Abreaction is employed to relieve the patient of fears related to her inability to develop complete anesthesia or analgesia by usual methods. During these subsequent visits emphasis is placed on deepening the trance. Under hypnosis she is told just what feeling and sensations and experiences she may expect during labor and delivery. Therefore, if and when they do occur, they will not seem to be new experiences to her. During at least two antepartum sessions the patient is asked to carry out suggestions under hypnosis with her eyes open. Under hypnosis, all patients are examined a week or so prior to term to determine the feasibility of elective induction of labor. The husband is encouraged to attend at least one of the training sessions. His permission should always be obtained before hypnotic training is started.

In my experience I have found that a patient is best able to go through labor and delivery without pain by developing some degree of analgesia or anesthesia from the knees to the chest. Also she should develop a lack of awareness, or a feeling of detachment from her body. Naturally her physician should be in constant attendance; this is not absolutely necessary, however. Transference of guidance may be easily given to a nurse, intern, or resident, with reinforcement from her own physician from time to time.

The following posthypnotic suggestions are repeated several times to each patient under hypnosis, during the training sessions. The only things she will remember are the pleasant things; time will pass quickly; she will remain calm, confident, courageous, without fatigue or exhaustion; other noises will not disturb her; there will be no pain associated with any of the sensations during labor or delivery; watching the delivery will be interesting; the area of the stitches will remain numb until completely healed; etc.

Postpartum instructions, when given under hypnosis, are carried out faithfully and are much more effective, than in the waking state. Drying up

or increasing lactation can usually be accomplished by merely making direct suggestions.

Hypnosis is employed prior to the sixth month of pregnancy when the patient complains of nausea, vomiting, excessive salivation, insomnia, emotional instability, excessive fatigue, etc.

In summary, the patient is conditioned for hypnosis with reading material and a tape recording. On her second visit she is taught how to relax and hypnosis is induced. Subsequent visits are devoted to deepening the trance, developing numbness, and giving her posthypnotic suggestions for childbirth.*

In the last few years I have successfully employed a modification of the Grantly Dick Read technique of natural childbirth. Several of these patients have subsequently been delivered under hypnosis. Almost without exception these patients enthusiastically prefer hypnosis. As they state, the duration of labor seems shorter, there is less fatigue and nervous exhaustion, relaxation is easier and much deeper, an anesthetic is not required for the episiotomy and the repair, the stitches are not painful, and they have more energy and vitality during the entire recovery period.

Giving case histories at this time would be only a repetition of the above material. However, a brief summary of my private cases is as follows. Primigravid patients averaged five hours of labor. Multigravid patients averaged three and one-half hours of labor. Labor was induced in about 25 per cent of the hypnotized patients. All deliveries were either normal spontaneous (75 per cent) or by elective low forceps. One third of the hypnotized patients went through labor and delivery (including episiotomy and repair, manual exploration of the uterine cavity, examination of the cervix, posterior colporrhaphy in all multigravid patients) without the use of any drugs or anesthetic.

If hypnosis can be as effective as narcotics and barbiturates in alleviating anxiety and pain during childbirth, then it certainly appears to be a very valuable asset in the care of an obstetrical patient. In patients who respond well to hypnosis, I find that, because they can cooperate actively, hypnosis is much superior to drug sedation and anesthetics. Naturally, there is no drug depression of respiration in the newborn.

The intelligent use of hypnosis allows the patient greater mastery of her emotions and feelings in her everyday living. Anxiety, tension, and apprehension can therefore be tremendously decreased. It becomes obvious, then, that hypnosis affords many major benefits and advantages to the obstetrical patient, if her physician is willing to take a little extra time to help her. Physicians should make every effort to eliminate the cause of the fear, anxiety, and pain of childbirth.

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*My detailed word-for-word description of the exact technique of teaching relaxation, inducing hypnosis, giving instructions for childbirth, and the complete content of the *Hypnosis Leaflet* and the tape recording can be found in a new book to be published soon, entitled *Hypnotism Handbook*, by Charles E. Cooke and A. E. Van Vogt, and published by Griffin Publishing Co., Los Angeles.

A WIDER OUTLOOK IN OBSTETRICS

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THE care of parturient women in hospitals has become almost the rule in this country and, with the advent of increased facilities and the likelihood of a continuing shortage of doctors, institutional care for all but a small percentage may be looked forward to in the years immediately ahead. This means that more than four million women will need obstetrical care in the next and in each succeeding year, a fact that raises important questions. Who is going to deliver all these babies and how adequate is the maternal care going to be? Is obstetrical care in general going to concern itself chiefly with the safeguarding of women against the hazards of pregnancy and labor or in addition will there be a wider recognition of the importance of providing opportunities for women to prepare themselves for childbirth and their roles as mothers? If such preparation is accepted as a part of good obstetrical care who is going to assume the leadership in directing its course? Such questions cannot be answered fully at this time but there are pertinent facts available which should interest all those whose minds are not made up.

It appears clear to many obstetricians who have interested themselves in these matters that leadership in obstetrical care should continue to come from obstetricians and that such care today should include an appraisal of, and an effort to satisfy, certain psychological needs of the woman in pregnancy, labor, and the puerperium. Thus Dr. N. J. Eastman[1] phrases the question, "Who is going to deliver all these babies and provide the desired teaching and emotional support for mothers during pregnancy, labor and the puerperium?" Dr. Eastman, however, goes beyond this and suggests an answer.

The experiences of the Maternity Center Association of New York working under varied conditions and those of Dr. Eastman at the Johns Hopkins Hospital warrant serious consideration. Both have shown conclusively that the nurse-midwife working in collaboration with the obstetrician can take excellent care of women throughout pregnancy, labor, and the puerperium. In the words of Dr. Eastman, "As for the role which nurses with this training can play on the obstetric team, the transcendent contribution which they have to make is a unique personalized form of attention throughout pregnancy, labor and the puerperium. By training, temperament and outlook they are singularly fitted for this important mission."

Dr. Eastman's convictions arise out of an experiment which was set up at the Johns Hopkins Hospital in 1953, (a) to study the feasibility of training nurse-midwives in a university obstetric clinic; (b) to evaluate the specific contributions which well-trained nurse-midwives can make to maternity care; and (c) to ascertain the role which nurses so trained can most advantageously play on the obstetric team.

The program was set up and carried through by nurse-midwives trained at the Maternity Center Association. The nurses who underwent training under their tutelage were referred to as Obstetric Assistants. Under medical supervision and with medical consultation always available they assumed complete responsibility for antenatal, intrapartal, and postpartal care of the women who were assigned to them. In the antenatal period in addition to the routine examinations they gave each mother instructions in maternal changes and hygiene in pregnancy, growth and development of the baby, family relationships, diet, labor and delivery, and exercises in preparation for labor.

Whenever the mother was in actual labor the Assistants remained with her, giving support, nursing care, and carrying out orders for medications and treatment within the limitations of the standing orders. The delivery of the baby and the responsibility of the mother and baby during the immediate postpartal period were assumed by the Obstetric Assistants. Throughout the whole labor period medical consultation and supervision were available. In the postpartal period the Assistant continued to assume responsibility under medical supervision, giving mothers instruction in postpartal exercises, care of the baby, and adjustment of the family to the new baby. Dr. Eastman[1] says, "I have watched all this with my own eyes and am convinced that the meticulous type of care they give is the answer to the greatest weakness in American obstetrics, lack of emotional support both in pregnancy and labor."

Although my own experience in working with nurse-midwives has not been as comprehensive as that of Dr. Eastman, my conclusions as to their worth on the obstetric team are equally enthusiastic. In 1948 when we were setting up our preparation-for-childbirth program at Yale the Maternity Center Association gave us most generous assistance which included the support of two nurse-midwives each serving six months before replacement by others. This arrangement continued for two years. The main function of these additions to our staff was the preparation of mothers and the teaching of nurses in the preparation techniques. Their usefulness for us went far beyond this, however, for group after group of medical students requested instruction from them which was enthusiastically given and received. A considerable part of their time too was given to visiting doctors and nurses who wanted firsthand information about the program.

I, too, with my own eyes have seen a good deal of what Dr. Eastman has reported and I will go farther and say that as a teacher of obstetrics I would rather see a medical student witness his first normal labor and delivery under the management of a well-trained nurse-midwife than under that of a verdant intern in the first part of his hospital training. I would be assured that the student would be impressed with the perfection of her experience and the confidence and dignity which she would bring to the occasion.

Now, those who are advocating a wider use of the qualified nurse-midwife as a part of the obstetric team must not be misunderstood in this matter. Their proposals have no relation whatsoever to the midwife system which was once a part of the American obstetric scene which many of us had to live and contend with. To their thinking the advent of the nurse-midwife is more revolutionary

than evolutionary. The type of training exemplified by that of the Maternity Center Association and by that which Dr. Eastman has carried out in Baltimore has many advantages other than those previously spoken of, among which is the offering of an important career to the nurse who wishes to go beyond that of equally important obstetric nursing. Indeed, its wider extension well might serve to interest young women in entering nurses' training in order to become qualified to go on to this type of career.

In a recent report of the Maternity Center Association[2] covering a twenty-year period it is notable that not one of the Association graduates went into private midwifery practice. "All carried into their work the concept of the complete obstetric team, consisting of the family served, the obstetrician, the nurse-midwife, the hospital, and the social worker when needed."

The challenge today to American obstetrics is that every woman in the land whose destiny it is to produce the citizens of tomorrow is entitled to the best care that scientific obstetrics can give, and this means for her not only a safe delivery but one of satisfaction to her as an individual. This involves an individualized type of care during pregnancy and parturition which will afford her full opportunity to prepare herself physically and mentally for her part in childbirth and for her role as a mother.

The primary leadership in planning ahead properly rests in the medical profession and it cannot be limited to medical school teachers and the heads of large maternity clinics. Leadership to be effective must be assumed to a considerable degree by all obstetricians who are desirous of raising the standard of obstetrical practice in the communities which they serve.

As far back as 1931, Dr. Benjamin P. Watson[3] of the Sloane Hospital for Women, having studied and worked with the qualified nurse-midwife system in Great Britain, declared before the New York Academy of Medicine, "I should like to see every obstetrical hospital with a staff of trained midwives," words which seem prophetic today. More recently Sister Theophane Shoemaker,[4] a graduate of the Maternity Center Association school for nurse-midwives and director of the Catholic Maternity Institute in Santa Fe, New Mexico, stated her belief that every hospital with an obstetric department could use at least four certified nurse-midwives, one for teaching parents, the other three to attend mothers in labor, one for each of the eight-hour work periods. Emphasis too, comes from the Maternity Center Association to the effect that the nurse-midwife should not function as a lone worker but that her skills are best realized as part of an obstetric team supplementing, not supplanting, the other members.

The question may arise in the minds of obstetricians as to the way the broad development of such a program might affect the private practice of obstetrics as we know it. I believe that it would assist in removing many present-day burdens and in addition improve the quality of obstetric care. The use of the nurse-midwife in the obstetric team could readily be the solution to certain difficulties seen by Dr. Philip A. Reynolds[5] in maintaining a preparation and support program. He states, "The demands of such care require

an expenditure of physical and emotional energy on the part of the physician quite impractical for the average obstetrician and could be made possible only by the limitation of practice to a relatively small number of patients.''

If the nurse-midwife plan is to be expanded it is obvious that training centers must be set up under some such pattern as Dr. Eastman's. The requirements of admission to such a course should be standardized along with a suitable curriculum. The general aim should be to place the status of the nurse-midwife on a par with that now enjoyed by nurses as specialists in public health, pediatries, and mental hygiene nursing.

What can be said about the present status of preparation programs in this country? Certainly progress has been made, more than is realized by most doctors. Since the beginning of the Yale program there have been some thousands of requests for information, a good proportion from doctors and nurses. We hear of programs successfully operating in faraway places, in Japan, New Zealand, Australia, Argentina, to mention some.

In this country, programs are being carried out not only in teaching centers but other places, some in remote areas. Patterns vary all the way from classes given in hospitals and public buildings to those given in the private offices of doctors. Some obstetricians practicing in groups or partnerships have added nurses to their staffs for the primary purpose of training mothers.

Over the years a significant number of nurses have come to the Yale clinic, some for short periods of observation and others for definite postgraduate study. For a considerable period the preparation program has been chiefly administered by a member of the Yale Nursing School faculty who holds a certificate in nurse-midwifery from the Maternity Center Association.

I am convinced that Dr. Eastman's experiment is a signal contribution to American obstetrics and that his results are a striking confirmation of the aims and ideals which the Maternity Center Association has held all through the long years of pioneering. Nurse-midwifery today, even with its limited representation, is a material influence in American obstetrics. I believe it has an important destiny but how rapidly this will go on to greater fulfillment depends upon how readily the vision of the comparative few becomes the vision of the many.

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PLACENTA ACCRETA

Report of Eight Cases*

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ALTHOUGH the condition now called placenta accreta was known to the ancients, it was not until 1588 that the first case report in modern medical literature was made by Plater. According to Arbogast[1] the first autopsy report of placenta accreta was made by Morgagni in 1822. Hofmeier[2] first described the underlying pathology in 1890. Von Weiss[3] reported a case of placenta accreta in placenta previa in 1897. Schwarzenbach[4] in 1900 described a case in which the placenta was inseparably attached to a fibroid. All cases of placenta accreta reported up to that time had terminated in death of the mother. In this same year (1900), however, Alexandroff[5] reported the first recovery. Since that time, many additional cases have been reported so that about two hundred cases may now be found in the medical literature.

Incidence.—It is probably impossible to determine with any degree of accuracy the incidence of placenta accreta. Hirst[6] estimated that it occurs once in 40,000 deliveries. Irving and Hertig[7] reported an incidence of one in 1,956 cases of pregnancy, an estimate far higher than has been reported by any other investigator. The 8 cases reported in this paper occurred in three hospitals. All were treated personally or in consultation by me. The 4 cases reported from Fitzgerald Mercy Hospital occurred among 39,917 viable deliveries and 2,738 cases of abortion. The total incidence of placenta accreta in all pregnancies at this institution is therefore 1 in 10,884.

Classification.—Placenta accreta is the condition of the placenta in which invasion of the myometrium by the chorionic villi causes an inseparable attachment of the placenta to the uterus. On the basis of area of attachment placenta accreta is classified as: (1) total, entire placenta attached; (2) partial, several cotyledons attached; (3) focal, attachment of small areas. Partial and focal accretas are much more frequently encountered than total accretas. Placenta accreta is also classified on the basis of depth of penetration of the uterine wall as: (1) placenta accreta, shallow penetration; (2) placenta increta, deep penetration; (3) placenta percreta, the villi pass entirely through the uterine wall.

Pathology.—Abnormalities in the maternal portion of the placenta are responsible for placenta accreta. In the absence of the decidua basalis in any part or all of the placental area, the chorionic villi penetrate the exposed myometrium and become inseparably attached to the uterine wall.

The histological picture found in uteri containing placenta accreta has been quite uniform in pattern. Nitabuch's layer normally formed by the

*Presented at a meeting of the Obstetrical Society of Philadelphia, Nov. 3, 1955.

decidua at the junction of the trophoblast and decidua is either poorly developed or absent. Rohr's layer may be normal but is more commonly reported as irregular and less marked in extent than is seen in normally implanted placentas. The chorionic villi are seen to be intertwined with the myometrium. The uterine wall in these areas is unusually vascular with large uterine sinuses. Granulation tissue, inflammatory cells, and deposits of fibrin in varying amounts are usually noted.

Etiology.—Placenta accreta may be caused by anything that markedly injures or destroys the endometrium. Changes in treatment of uterine dysfunctions and pathology have changed the etiological factors responsible for placenta accreta. Some of the frequently reported etiological factors of former years are no longer seen. Unfortunately, new factors are being encountered which more than compensate for the now obsolete ones. DeCarle[8] divided the causes of placenta accreta into five groups.

Phaneuf[9] listed the causes of placenta accreta as: manual removal of the placenta in one or more previous pregnancies, too vigorous or repeated curettage, medication of a destructive or erosive type or vaporization in the uterus (obsolete), submucous myomas with atrophy of the overlying mucosa, steaming the uterus (obsolete), affections of the endometrium—endometritis, pyometra, septic puerperal processes, faulty position of the placenta—placenta previa, pregnancy in a uterine diverticulum.

To this list we must now add scars in the uterus from previous cesarean sections, and the effects of nonsterilizing doses of radium in the uterine cavity.

Diagnosis.—Placenta accreta produces no evidence of its presence prior to the expected time of placental separation. At that time, whether early in pregnancy or after full-term delivery, a characteristic clinical course of events occurs. In complete placenta accreta no bleeding and no evidence of placental separation occurs. In partial and focal placenta accretas bleeding similar to that with normal placental separation is encountered but the placenta is not expelled and cannot be expressed from the uterus with permissible fundal pressure. When such fundal pressure is persisted in until the placenta is expelled it will be found that portions of it are missing. Hemorrhage then becomes excessive. In order to establish the clinical diagnosis of placenta accreta a hand must be inserted into the uterus and an attempt made to separate the placenta from the uterine wall. The lack of a cleavage plane in all or part of the area of placental attachment confirms the clinical diagnosis of placenta accreta.

Positive proof of placenta accreta can be obtained only through histological examination of tissue from the placental site of the uterus. In cases of suspected placenta accreta successfully treated by conservation of the uterus such tissue is not available. The diagnosis of placenta accreta in such cases is based entirely on clinical evidence, and its accuracy has been questioned by some investigators. It is true that only 10 per cent of adherent placentas are due to placenta accreta. However, the clinical courses in some of the cases treated by conservation of the uterus leave little room for reasonable doubt that they were true cases of placenta accreta.

Complications.—Many complications of placenta accreta have been reported. Spontaneous rupture of the uterus has been reported several times. Placenta accreta and placenta previa commonly occur together. Attempted manual separation and vigorous attempts at expulsion of the placenta have resulted in traumatic rupture and in inversion of the uterus. Gangrene of the uterus, peritonitis, salpingitis, and fatal hemorrhage have all been observed. Polyhydramnios and fetal abnormalities have also been reported in cases of placenta accreta.

Treatment.—The treatment of placenta accreta has recently become a matter of controversy. In 1937, Irving and Hertig[7] analyzed their own and all previously reported cases of placenta accreta with respect to methods of treatment and end results. They reported a total mortality of 37.2 per cent in 86 cases. Supravaginal hysterectomy without any attempt at manual removal of the placenta resulted in zero mortality. Manual extraction alone caused 64.5 per cent mortality. In 3 cases in which the placenta was left in the uterus, 2 patients died and one recovered, thus giving a 66.6 per cent mortality rate. It is obvious, therefore, that up to 1937 supravaginal hysterectomy without attempts at manual removal of the placenta gave such decidedly better results that no other method of treatment seemed justified. Since that time, however, changes in medical techniques and reports of successful treatment of placenta accreta with conservation of the uterus have made it necessary to reappraise the treatment of this condition.

Prior to 1937, only a few patients with placenta accreta had received blood transfusions regardless of the method of treatment. Since that time blood transfusion has become routine in the presence of hemorrhage. The development of powerful antibiotics has greatly decreased the danger from infection. With these two great protective agents available and with the assurance afforded by successful conservative treatment of the placenta in abdominal pregnancies, it is natural that conservative treatment of placenta accreta should have been tried. A number of such cases have now been reported, 4 by Schumann[10] alone. This report adds 3 more, 2 with recovery, one ending fatally. The great majority of cases of placenta accreta reported since 1937 have been treated by hysterectomy and statistically this gives by far the best results. The number of cases successfully treated with conservation of the uterus has, however, been sufficient to lead to confusion as to the proper treatment of this condition. It therefore seems necessary to propose a course of action which may be followed when placenta accreta is encountered.

When the placenta is not delivered after a reasonable length of time, a hand should be passed into the uterus and a gentle attempt made to separate the placenta from the uterine wall. When a cleavage plane cannot be found, the operator should consider the probability of placenta accreta and should make no further efforts at manual separation. In the absence of hemorrhage uterine packing is not required. Hemorrhage should be treated by packing of the uterus and blood transfusions. Antibiotics should be administered. When the uterine pack is removed after 24 to 48 hours, a second gentle attempt at manual removal of the placenta may be made. If this is not successful, a decision must be made with respect to further treatment. Immediate hysterectomy is advisable in most cases. Occasionally, the patient's condition will not warrant operation. In such cases and in the case of a young primipara or a woman ardently desiring more children, conservative treatment may be tried. Antibiotics and the use of adequate amounts of blood are essential. Conservative treatment may be persisted in as long as there is neither alarming bleeding nor infection. Persistent or recurring profuse bleeding makes hysterectomy mandatory. Developing infection should be treated by hysterectomy before it reaches proportions that make surgery impossible.

Conservative treatment of placenta accreta is always hazardous, frequently fatal, and often of no practical value. The postpartum course is almost invariably stormy and requires prolonged hospitalization. When undertaken electively, it is justified only by the hope of subsequent childbearing. In this respect, reported results are disappointing. Two of Schumann's[10] patients subsequently bore a child without trouble. One patient here reported later bore a child but required hysterectomy because of re-

currence of placenta accreta. Other patients (as illustrated by Case 1 of this report) failed to become pregnant again. In view of these facts, conservative treatment of placenta accreta should be used only when required by the physical condition or demands of the patient. When discovered at cesarean section, placenta accreta should almost invariably be treated by immediate hysterectomy.

Case Reports

CASE 1.—Mrs. J. K., aged 21 years, para 0, gravida i, was delivered of male twins at 36 weeks of pregnancy. Manual removal of the placenta two hours later was unsuccessful. The uterus was packed. Twenty-four hours later about half the entire placenta was removed with considerable difficulty. The uterus was again packed and blood transfusions given. Moderate bleeding was encountered on removal of the uterine pack and continued throughout the sixteen days of hospitalization. A bloody, foul-smelling discharge persisted for four months. Menstruation was re-established seven months post partum. There was no clue to the etiology in this case. Although successfully treated without hysterectomy, she has never again become pregnant.

CASE 2.—Mrs. B. S., aged 41 years, had an adherent placenta which may have been a partial placenta accreta, in the fourth pregnancy. Definite placenta accreta was encountered in the fifth pregnancy since only portions of the placenta could be removed manually. Conservative treatment, with packing and blood transfusions, was successful, with discharge from the hospital on the fourteenth day. In the sixth pregnancy, starting six months later, placenta accreta was again encountered. Two attempts at manual removal were unsuccessful. Supravaginal hysterectomy was done. Recovery was uneventful.

CASE 3.—Mrs. G. G., aged 24 years, para 0, gravida i, was delivered at term. The spontaneously expelled placenta showed unmistakable evidence of a placenta succenturiata having been present but not expelled. Profuse bleeding on the ninth postpartum day was treated by dilatation and evacuation, packing of the uterus, and transfusion. Recurrence of profuse uterine bleeding forty-eight hours later was similarly treated. When profuse bleeding again occurred fifty-seven hours later, supravaginal hysterectomy was done. Histological examination confirmed the clinical diagnosis of placenta accreta in an accessory lobe. Recovery was uneventful.

This case of placenta accreta in a placenta succenturiata occurring in a young primigravida with no known etiological factors is probably unique in medical literature. Attempted conservative treatment had to be abandoned because of recurring profuse hemorrhage.

CASE 4.—Mrs. M. B., aged 31 years, para iii, gravida v, was delivered at term. Unsuccessful attempt at manual removal of the placenta was followed by supravaginal hysterectomy. Histological examination showed total placenta accreta. Recovery was uneventful.

CASE 5.—Mrs. H. T., aged 35 years, para iv, gravida v, was delivered by cesarean section because of central placenta previa at thirty-four weeks of pregnancy. The placenta could not be separated. The uterus was packed. Removal of the packing twenty-four hours later was followed by profuse bleeding. Dilatation and evacuation and packing of the uterus were done. Transfusions were given. When uterine bleeding recurred after removal of the pack, I was called in consultation. Elevation of temperature and evidence of generalized peritonitis precluded operation. Supportive treatment, including ten blood transfusions, was given. Death occurred on the twenty-fourth postpartum day. Autopsy revealed generalized peritonitis and placenta accreta.

In retrospect, there was no justification for conservative treatment of placenta accreta in a woman 35 years old with five living children. With so much of the placenta

inseparably attached to the lower uterine segment, the cesarean section should have been followed by immediate hysterectomy. The rapid development of generalized peritonitis made any change in the type of treatment impossible.

CASE 6.—Mrs. F. G., aged 38 years, para ii, gravida iii, was admitted to Fitzgerald Mercy Hospital with a criminally induced, septic, incomplete abortion at 2½ months of pregnancy. Profuse bleeding required dilatation and evacuation on the third hospital day. The placenta could not be separated. Uterine packing, transfusions, and supportive treatment controlled the bleeding and cleared up the infection. Supravaginal hysterectomy was done on the eleventh hospital day. Histological examination revealed placenta accreta at 2½ months of pregnancy. Recovery was uneventful.

This is one of the earliest cases of placenta accreta so far reported. The accreta was probably due to a long-standing genital infection. Its presence was made known at that early stage of pregnancy only by the attempted criminal abortion. Conservative treatment was never contemplated. The delay in performing the hysterectomy was due to the presence of acute infection of a degree sufficient to contraindicate major surgery.

CASE 7.—Mrs. C. D., aged 33 years, para i, gravida v, was delivered at term. Three unsuccessful attempts at manual removal of the placenta were followed by total hysterectomy. Histological examination revealed partial placenta accreta. Recovery was uneventful.

This case illustrates the importance of the suggested course of early treatment in suspected cases of placenta accreta. Although hysterectomy was not performed until 3½ hours after delivery and after three unsuccessful attempts at manual removal of the placenta, the superficial myometrial invasion found on pathological examination suggests the possibility that most of the placenta might have been removed had we waited for twenty-four hours and again tried manual removal at that time. The relatively small portions of the placenta in which deeper invasion of the myometrium had occurred might have sloughed away without serious risk to the patient. It is probable that cases of placenta accreta successfully treated by conservative means have similar pathological findings. This case, although not treated conservatively, lends credence to the belief that some cases of true placenta accreta may properly be so treated. Unfortunately, we have no clinical way to determine either the area or depth of myometrial invasion.

Summary

The subject of placenta accreta is reviewed in all essential aspects. A course of action is proposed for the treatment of placenta accreta. It is believed that this plan of treatment is in accord with present-day concepts of good obstetrical and surgical practice. Eight previously unpublished cases of placenta accreta occurring in seven different women are reported. Three cases were treated conservatively with one death, a mortality rate of 33.3 per cent. Five cases were treated by hysterectomy with no deaths. The over-all mortality rate in this group of cases was therefore 12.5 per cent.

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PLATELET DECREASE AND DISAPPEARANCE IN OBSTETRIC CONDITIONS

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THE purpose of this brief communication is to make some interesting platelet count data available to workers studying coagulation defects in pregnancy. In this study, platelet counts were found to be lowered in several pregnancy states and platelets disappeared from the circulation in two cases of eclampsia and one case of pre-eclampsia. Increased recognition of hemorrhagic conditions in pregnancy has aroused interest in platelets. Platelets are participants in the succession of reactions that lead to clot formation; how important platelets are in aberrations of this mechanism during pregnancy is uncertain. The concept that disintegration of platelets causes vasoconstriction is intriguing to obstetricians because of the predominance of vasoconstriction in toxemia.[1]

Textbooks of laboratory methods and diagnosis cite 200,000 to 400,000 platelets per cubic millimeter of blood as normal human values. They warn that if the platelets fall below 60,000, a hemorrhagic tendency may appear. Dieckmann and Wegner[2] reported that in pregnancy the platelet count showed means of 206,000 to 241,000. In mild toxemia the count was unchanged and in a few cases of eclampsia the platelet count ranged from 350,000 to 600,000.

Benhamon and Nouchy[3] observed the platelet count to be increased in pregnancy but lowered during labor. Pritchard and associates[4] reported 3 cases of thrombocytopenia associated with intravascular hemolysis and clotting defects; this thrombocytopenia occurred in the presence of severe toxemia, probably eclampsia, in at least 2 of the 3 instances. Ratnoff and co-workers[5] could find no significant platelet count change in pregnancy or labor, but did find a reduced platelet count in 8 out of 28 toxemic patients.

Ward and MacArthur[6] reported that the average platelet count in pregnancy was 141,000 and in the nonpregnant woman, 182,000. Patients in labor had a reduction in platelet counts with an average of 124,000. Still lower were their values for patients with severe pre-eclampsia and eclampsia, averaging 97,000.

Method

The platelets were counted with a modification of the technique of Brecher and Cronkite,[7] devised by Delaney and Kay. The changes included the use of a standard microscope instead of phase microscope equipment, and a 0.73 per cent ammonium oxalate solution rather than a 1 per cent solution; one drop of brilliant cresyl blue was added to each 10 ml. of solution. This method gave a direct count of the platelets and utilized siliconed glassware. Accurate and reproducible results were obtained with this technique.

Results

Normal pregnancy had the highest counts, followed in order by pre-eclampsia, labor in normal patients, eclampsia, and, with the lowest count, abruptio placentae. In each category of patients, the average count was slightly higher than the median. The platelet counts in these categories are summarized in Table I.

TABLE I. PLATELET COUNTS IN VARIOUS CONDITIONS OF PREGNANCY. NUMBER OF PLATELETS PER CUBIC MILLIMETER

	NORMAL PREGNANCY	PRE-ECLAMPSIA	NORMAL PATIENTS IN LABOR	ECLAMPSIA	ABRUPTIO
No. determinations	40	19	10	17	20
No. patients	29	16	6	12	12
Average platelet count	198,310	154,052	143,900	131,617	120,025
Median platelet count	185,000	143,000	141,250	125,000	91,250

1. Normal Patients.—Forty platelet determinations were made in 29 patients in order to establish the values in normal pregnant patients. The counts ranged from 100,000 to 332,500 per cubic millimeter, with a median of 185,000 per cubic millimeter and an average of 198,310 per cubic millimeter. No discernible change in the platelet count was noted with the progression of pregnancy. It is worthy of note that no normal patient had a count of less than 100,000 platelets per cubic millimeter.

2. Pre-Eclampsia.—Pre-eclampsia was defined as persistent hypertension (140/90) or albuminuria that first appeared after the twenty-fourth week of pregnancy and disappeared soon after delivery. Nineteen platelet determinations were made in 16 patients with pre-eclampsia and the counts were found to be lower than in normal pregnant patients. The counts ranged from zero to 305,000 platelets per cubic millimeter. The average count was 154,052 per cubic millimeter and the median 143,000 per cubic millimeter. Three counts, made in 3 patients, were below 100,000 per cubic millimeter. The case history of the patient with a zero count will be summarized later.

3. Labor in Normal Patients.—These patients had lower average and lower median platelet counts than the pre-eclamptic patients, although there were no counts below 100,000 per cubic millimeter. Ten determinations were made in 6 patients, and the range was from 102,500 platelets per cubic millimeter to 193,000 per cubic millimeter.

4. Eclampsia.—Seventeen platelet counts were done on 12 eclamptic patients. The counts ranged from zero to 287,500 platelets per cubic millimeter. The average count was 131,617 per cubic millimeter and the median, 125,000 per cubic millimeter. The intervals between convulsion and platelet count ranged from one to twenty-four hours with a median of four hours. Seven counts, in 6 patients, were below 100,000 per cubic millimeter. The case histories of 2 patients with zero counts will be summarized later.

5. Abruptio Placentae.—This condition was accompanied by the lowest average and median platelet counts, which were 120,025 and 91,250 per cubic millimeter, respectively. There were 20 counts in 12 patients. Thirteen of these counts (8 patients) were below 100,000 platelets per cubic millimeter. These were all genuine cases of abruptio and did not include cases of rupture of the marginal sinus of the placenta. These low counts occurred despite the fact that 7 of the 12 patients had received transfusions before the platelet determinations.

6. Miscellaneous Conditions.—Several miscellaneous conditions were explored to see if they were accompanied by unusual platelet counts. The number of platelets was definitely reduced in 3 determinations on a pregnant patient

with sickle-cell anemia (35,000, 47,500, and 90,000). The platelet counts were within normal limits in the following cases: pregnancy with Hodgkin's disease and uremia; epileptic convulsions in pregnancy (2 cases); intrapartum and postpartum uterine hemorrhage of undetermined cause (2 cases); cured pre-eclampsia with dead fetus; and ruptured uterus.

R. W., a patient in the middle trimester of pregnancy, had melena, hematemesis, hematuria, and epistaxis. The platelet count was 260,000 per cubic millimeter. A diagnosis could not be made. She recovered without treatment and had a normal delivery.

R. S. seemed to exhibit opposite coagulation behavior at the same time. She was a patient at term who had pre-eclampsia superimposed on chronic hypertensive disease. On admission she had a hematocrit of 26 per cent, hematuria, a small amount of vaginal bleeding, and no fetal heart tones. A diagnosis of abruptio placentae was made and she delivered a stillborn infant at 6:00 A.M. Six hundred milliliters of clotted blood was expressed with the placenta. She continued to bleed from the uterus as well as the nose, lungs, urinary tract, and elsewhere. A subtotal hysterectomy was started at 9:50 A.M. and finished at 10:30 A.M. A Couvelaire uterus was found. There was some difficulty in controlling hemorrhage from the cervical stump but the hemorrhagic diathesis disappeared toward the end of the operation. The patient received 3,000 ml. of blood before the operation and 2,000 ml. during the operation. At 11:30 A.M., thirty minutes after the termination of the operation, a count was done. The number was 25,000 platelets per cubic millimeter and, strangely, the blood taken for this count clotted in five minutes in the silicon-coated syringe with which it was withdrawn from the vein. The patient recovered although she developed pituitary necrosis.

Case Histories of Patients With Disappearance of Platelets

None of these patients had a family or past personal history of bleeding tendency. All were in good health after the illness described here. Although not specifically looked for at the time of the zero counts, a review of the patients' histories showed no appreciable change in blood pressure near the time of the zero counts. Hemolysis was not recorded in any case history. The two technicians who performed all of the platelet determinations have done many counts with the same technique in a wide variety of medical and surgical cases but have not encountered elsewhere another zero count.

Eclampsia With Disappearance of Platelets.—A. M., a 22-year-old Negro primigravida was admitted in labor in the forty-second week of gestation at 5:30 A.M. She had had no antepartum care. Her blood pressure was 128/86, albuminuria was 4 plus, and edema, 2 plus. Her weight gain could not be ascertained. Dilation was 4 cm. She was given meperidine and scopolamine for sedation. At 9:20 A.M. while being prepared for vaginal examination, she experienced a typical eclamptic convulsion that lasted one minute. The convulsion was controlled by amobarbital sodium. She later received morphine and phenobarbital sodium. All drugs were administered intravenously. At 10:30 A.M. the platelet count was zero. Forceps delivery of a normal baby took place at 8:00 P.M., and spontaneous delivery of the placenta occurred five minutes later. She lost 500 ml. of blood with the placenta. The patient's blood pressure fell to 100/70 and her pulse rose to 140. These improved promptly with a transfusion of 500 ml. There was no other hemorrhage of any type. Oliguria lasted for eight hours post partum and the blood pressure was elevated for only one day. Eleven hours post partum, the platelet count was 57,500 per cubic millimeter. On the second postpartum day, the count was 280,000 per cubic millimeter. Recovery was uneventful.

Eclampsia With Disappearance of Platelets.—R. A., an 18-year-old white primigravida with a normal antepartum course was admitted in the forty-second week of gestation at 2:00 A.M. in early labor. Her blood pressure was 112/86. There was no albuminuria, edema was 1 plus, the total weight gain was 15 pounds, and the hemoglobin was 11.5 Gm. During labor, her blood pressure gradually rose to 166/96. At 7:00 P.M. she lost about 50 c.c.

of bright red blood and then had a generalized convulsion lasting one minute. It was controlled with amobarbital sodium. The patient was examined but the cause of bleeding was not determined then or later. Abruptio placentae was eventually excluded as the diagnosis. Albuminuria was then 4 plus. The membranes were ruptured artificially and a normal child was soon delivered. There was no further hemorrhage or convulsion. Sedation was continued with morphine and phenobarbital sodium. Immediately after delivery the eye grounds were normal, the hematocrit was 37 per cent, and blood determinations were normal. Hypertension and albuminuria disappeared within twelve hours and the output was over 100 c. c. per hour. On the next day, sixteen hours after delivery, the first platelet count was attempted and no platelets were found. On the second postpartum day, the count was 182,500 per cubic millimeter, and on the third day, the count was 282,500 per cubic millimeter. Recovery was uneventful. An appendectomy and another delivery were without incident.

Pre-Eclampsia With Disappearance of Platelets.—R. W., a 16-year-old primigravida, was referred to Charity Hospital by a physician because of hypertension. She was admitted on June 28 at 1:00 P.M. Her blood pressure was 170/120, and no albuminuria was evident at this time or any other time; edema was 3 plus. The estimated date of confinement was probably in July. Blood chemistry determinations and urea clearance were normal and the hematocrit was 25 per cent. Morphine and phenobarbital sodium were given for sedation. The output was satisfactory. On the day after admission, at 11:00 A.M., the platelet count was zero; at 3:30 P.M., the count was 80,000 per cubic millimeter. On the next day, the count was 110,000 per cubic millimeter. No transfusion was given. Her blood pressure subsided gradually to 140/90 and labor was induced on July 7 with the uneventful delivery of a 7 pound baby. The hematocrit on the first postpartum day was 40 per cent. There was no hemorrhage at any time. At the postpartum visit, the patient's blood pressure was 130/80.

Why the platelets decreased in number and even disappeared can only be speculated upon at this time. Platelets do not participate in the disseminated intravascular coagulation that has been encountered in pre-eclampsia-eclampsia and abruptio placentae. If excessive utilization of platelets is not the cause of their decline, then massive platelet destruction is a possibility. Schneider[8] produced a marked reduction of platelets with experimental embolism in dogs.

Summary

Platelets counts were found to be reduced in pre-eclampsia, labor in normal patients, and eclampsia and abruptio placentae. This study included 12 patients with eclampsia and 12 patients with abruptio. Platelets disappeared from the circulation in one case of pre-eclampsia and 2 cases of eclampsia. The disappearance of platelets was not accompanied by any exceptional hemorrhagic events. No relationship was noted in the times of convulsion, zero count, delivery, bleeding, or recovery.

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INTRA-ARTERIAL NITROGEN MUSTARD IN ADVANCED PELVIC MALIGNANCIES

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SINCE the introduction of nitrogen mustard in the course of World War II, this substance has been used extensively in the treatment of neoplastic disease. While attempts have been made to evaluate the effect of the intravenous administration of HN2 in many types of neoplasms,[1] results that would give any encouragement for routine therapeutic application have largely been confined to Hodgkin's disease.

In 1950 a new approach to the administration of nitrogen mustard for the treatment of neoplasms was introduced by Klopp and his co-workers.[2] They produced by the intra-arterial injection of methyl-bis(2-chloroethyl)-amine hydrochloride effects not obtainable by the intravenous administration of therapeutic amounts of the same drug. Bierman and his co-workers[3] developed techniques for the catheterization of the aorta, celiac axis, superior mesenteric and renal arteries. By this method they were able to utilize vascular channels directly supplying the tumor area. It has been shown[4] that the arterial blood supply to most primary cutaneous tumors is greater than that of normal tissue. Dosages used in the intra-arterial method are four to ten times greater than similar therapeutic amounts of intravenously administered nitrogen mustard.[3] Barberio and his associates[23] in a comprehensive study showed that the survival times of dogs, given divided doses of intra-arterial HN2, were increased over those of dogs given the same amount in a single daily injection.

Bierman[5] reported prompt and marked improvement in four cases of mycosis fungoides in which regional intra-arterial HN2 therapy was given. Hematologic changes observed in these patients were much less severe than those encountered after intravenous administration. Bateman[6] observed that the effects on bone marrow and peripheral blood were essentially the same with either method, but larger doses of HN2 were tolerated when the route of administration was intra-arterial. By simultaneous aspiration studies she found that marrow in the region supplied by the catheterized artery was much more depressed than marrow from other sites.

There are at present, in the world literature, a number of reports dealing with the therapeutic efficacy of this method.[7-13] Most of these investigators feel that this technique is of limited value, and that the benefits obtainable

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are not sufficient to counterbalance the adverse effects, reactions, and unavoidable complications. The present paper, reporting upon a series of patients with gynecologic malignancies, as well as animal studies of combined intra-arterial and irradiation therapy, comes to the same conclusions.

Method of Action.—The nitrogen mustards exert a profound cytotoxic action, inhibiting or destroying nuclear function and bringing about the death of the cells. While a number of theories have been advanced to explain this action, no final biologic explanation is at present available. Mitotic arrest seems to be confined to the resting phase of the mitotic cycle.[14, 15] The susceptibility of a cell to the toxic effects of HN2 is apparently closely related to its proliferative activity.[14, 16]

The striking similarity between the biologic effects of x-rays and of the nitrogen mustard on neoplastic tissue has been the subject of comment by many workers.[17-19] The pattern of histologic change in the tissues is approximately the same with each agent, although the recovery time of animals subjected to intoxicating doses of each is more prolonged with irradiation than with nitrogen mustard.[18, 19]

Group A

The 20 patients who received intra-arterial nitrogen mustard administered into the aorta can be divided into two groups depending upon the sequence of their therapy. The initial group (Group A) of 15 patients received their irradiation before the administration of mustard, and the second group of 5 patients (Group B) received their irradiation after mustard therapy. In Group A a variety of gynecologic neoplasms were represented (Table I) but the patients had in common the facts that: (1) they had been treated "to tolerance" by previous irradiation, and further radiation therapy was felt to be contraindicated; (2) there was clinical and/or histologic evidence of continuing or recurrent growth of the neoplasm; (3) they were not considered to be satisfactory candidates for surgical extirpation of the lesion. All of them, in other words, already had a limited prognosis with any form of therapy which was then available to them.

TABLE I. DISTRIBUTION OF MALIGNANCIES IN GROUP A

	NO. OF PATIENTS
Cervix	5
4 League of Nations Stage III	
1 League of Nations Stage IV	
Cervical stump	3
All with extension	
Ovary	5
All with carcinomatosis	
Fundus	1
Extension beyond corpus	
Primary unknown	1
Squamous-cell carcinomatosis, probably cervical origin	

Results.—One of these patients is surviving 42 months after the initial therapy but the average survival for this group was approximately half a year. In 5 of the patients it is possible that the life expectancy was increased but in 4 there was clinical evidence that the therapy or its complications may have shortened the course; in the remainder there was little evidence that the patient's downhill course was influenced either way by the treatment.

The therapy was administered in this group through the femoral artery with retrograde catheterization, 15 per cent of the dose being given just below

the level of the celiac axis, the remainder administered just above the bifurcation of the aorta. In addition to the immediate complications listed in Table II, the subsequent postmortem findings are available in 6 of these women.

TABLE II. COMPLICATIONS IN GROUP A, TREATED BY RADIATION FOLLOWED BY HN2 (16 INJECTIONS)

Nausea and vomiting	16
Ileus	5
Diarrhea	4
Bleeding, ulceration and necrosis of bowel	3
Azotemia	5*
Oliguria	4
Skin lesions	2
Wound bleeding, infection, ulcer	2
Leg edema	1
Pancreatic dysfunction	1

*These were acute temporary elevations occurring after injection of HN2; not due to constricted ureters.

Two had tumor obstructing the ureters bilaterally with hydronephrosis, two generalized carcinomatosis, one a massive necrosis of the descending colon and rectosigmoid apparently from a local overdose of the mustard, and one with an extension of tumor to the entire pelvis died eleven months after therapy with ulceration and perforation of the bowel.

The specimens of the original tumor or of the metastases within the area of treatment showed, in most instances, continued growth of the neoplasm, and, while one patient showed an acute necrotizing cystitis and ureteritis, the principal toxicity of the HN2 was demonstrated in the intestinal tract.

Comments.—From these results it is apparent that, by this technique, nitrogen mustard has little to offer this group of patients. The hope that it could be a "last resort" form of therapy in extensive gynecologic neoplasm for which no other therapy was available was not sustained in these cases. Whether or not the already limited prognosis of these patients was significantly altered is problematic but the impression was gained from the point of view of complications and morbidity that the therapy appeared to be additive to the previous irradiation which these patients had been given to the point of presumed tolerance.

Group B

Accordingly, a smaller group of 5 patients were selected who had received no preliminary irradiation, and whose prognosis—since they had not demonstrated the factor of recurrence after complete radiation—was assumed to be considerably better.

The lesions in this group of women were predominantly ovarian adenocarcinoma with widespread metastasis (3 cases); one patient with carcinoma of the cervical stump which extended to the lateral pelvic wall, and one patient with combined carcinoma of the cervical stump and carcinoma of the ovary, both with extensive metastasis outside the pelvis.

TABLE III. COMPLICATIONS IN GROUP B, TREATED BY HN2 FOLLOWED BY RADIATION (8 INJECTIONS)

Nausea and vomiting	5
Diarrhea	1
Ileus	1
Wound hemorrhage	1

The treatment in this group was administered through the same routes. The immediate reactions (Table III) were milder and the amount of blood replacement required to restore the hemoglobin prior to discharge from the hospital was considerably less (1,000 c.c. per patient in Group A in contrast to 643 c.c. per patient for Group B).

The depression of the hematopoietic system was considerably more marked in the patients in Group A, the total white blood count dropping on an average to much lower levels, with a greater delay in recovery toward normal values. The patients in Group B, even though the average dose of nitrogen mustard injected was higher (8 injections averaging 1.09 mg. HN2 per kilogram of body weight in contrast to 16 injections averaging 0.89 mg. HN2 per kilogram in Group A) did not show the same degree of leukopenia (Fig. 1).

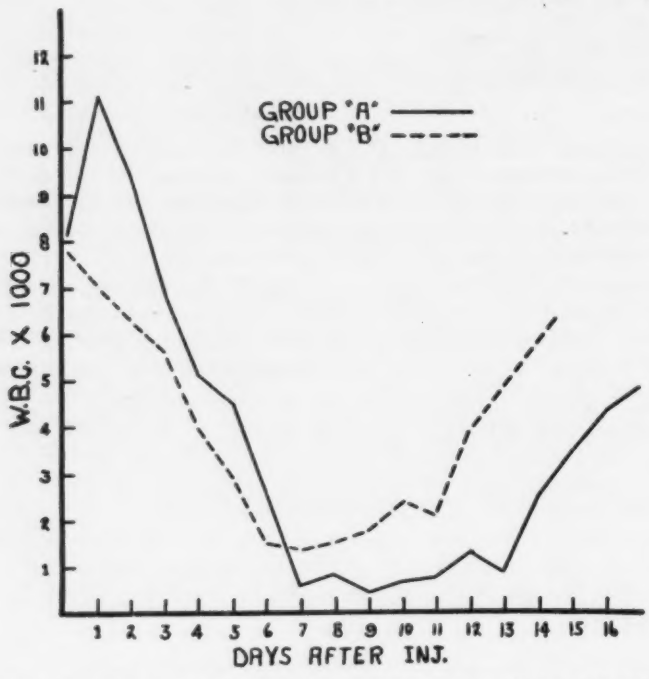

Fig. 1.—Average leukocyte count of 20 patients after intra-arterial injections of nitrogen mustard.

Two of these patients continued a progressive downhill course and died within three months after the therapy; 2 are still living, one 32 months and one 23 months post treatment; one died 33 months after therapy. No autopsy material is available in this group, but the average survival period post therapy (in contrast to that of the patients in Group A) is at the present time more than 18 months. These results are not significantly different from those reported by Sykes and co-workers[21] following the intravenous use of HN2 in inoperable ovarian carcinoma, and indicate no significant benefit to be gained from the intra-arterial larger doses.

Comment.—While the hazards of this form of therapy obviously outweigh any presumed advantages in these particular pelvic malignancies, it appears that the sequential relationship of the two therapeutic weapons was significant. When the nitrogen mustard injections are preceded by radiotherapy the complications are both more numerous and of greater severity. The concom-

itant animal studies which were carried out were designed to test this hypothesis in so far as possible, without the complicating circumstances (debility, renal disease, cancer) which were present in the patients.

Webber and his co-workers[20] in an excellent study of cellular mitosis in the duodenal mucosa of rats, demonstrated that the combined doses of irradiation and nitrogen mustard were more effective in suppressing mitosis and causing mucosal atrophy than two comparable doses of either irradiation or nitrogen mustard. Their study also suggests an importance in the sequential arrangement of these two cytotoxic agents. When 500 r was followed by 1 mg. HN2 per kilogram, the effect on mitosis was much more pronounced than when these agents were given in the reverse order.

Animal Studies

Fundamentally, the animal studies were designed first to determine the MLD50 dose of irradiation over the lower half of the body, and of intra-arterial nitrogen mustard administered into the aorta just below the celiac axis. The combinations of the two therapeutic modalities, both for their sequence and for their time relationships, were then tested against these known MLD dosages.

Rabbits weighing between 3 and 5 kilograms were employed. The irradiation was at 250 kv. over a 10 by 15 cm. port extending from the ischial tuberosities to the xyphoid process. Two treatments were given each week averaging 400 r to the midpelvic plane per treatment. The nitrogen mustard administered was methyl-bis(2-chloroethyl)-amine hydrochloride. The animals were followed during the post-mustard and postirradiation periods with frequent blood counts, weight change determinations, and, wherever possible, the profoundly morbid animals were sacrificed and autopsy performed. Gross and microscopic tissue observations were made, including sections of the lumbar and iliac marrow.

For both the irradiated animals and the animals treated with nitrogen mustard, the pathologic changes were microscopically exceedingly similar and were chiefly evidenced in the bowel, in the form of mucosal ulceration. These were somewhat more marked in the animals which had received irradiation, but, on the other hand, a more severe leukopenia occurred in the animals which received the nitrogen mustard.

The over-all results of these studies are summarized in Table IV. It will be seen from a consideration of this table that the MLD dosage for intra-arterial mustard was between 1 and 2 mg. per kilogram of body weight and that all animals survived 6,800 r to the midpelvic plane but could not tolerate 8,000. In Groups III and IV, however, no permutation or combination of these two dosages was found which significantly increased the death rate for the test animal. While the gross death rate is not necessarily the only criterion to indicate an additive effect of the two forms of therapy, nevertheless it was felt that any significant change in tolerance would be reflected in these figures.

Of the 24 animals in Groups III and IV, all survived the experiment except one. This rabbit did not tolerate radiation well, lost considerable weight during treatment, developed a severe upper respiratory infection forty-eight hours after the injection of HN2 and died on the fifth day post treatment. Autopsy was performed twelve hours after death had occurred. Aside from moderate emaciation and loss of body fat, there were minimal gross pathologic findings. Conclusive microscopic interpretation was frequently nullified by postmortem autolysis of the tissues.

The remaining animals in these two groups were sacrificed one to three months following completion of treatment. Microscopic sections of the various organs revealed little in the way of pathologic change. In a few animals, areas of capillary congestion were present in the wall of the urinary bladder and the lower gastrointestinal tract. Some sections showed fibrosis and hyaline degeneration of the skin and underlying subcutaneous connective tissue.[22]

TABLE IV. EFFECTS OF SEQUENCE OF TREATMENT IN ANIMALS TREATED BY RADIATION AND HN2

GROUP	TREATMENT SEQUENCE	NO. OF RABBITS	AVERAGE DOSE HN2 (MG./KILO.)	AVERAGE NO. ROENTGENS MIDPELVIC PLANE	TIME BETWEEN SEQUENCE	NO. OF ANIMALS DIED	AVERAGE SURVIVAL TIME
I	Intra-arterial HN2 (toxicity)	6	1			1	—
		8	2			6	10 days
		7	3			5	5 days
II	Radiation (toxicity)	6		4,000		-	—
		4		6,000		-	—
		6		6,800		-	—
		8		8,000		8	3 mo.
		4		10,000		4	2 mo.
III	Radiation and HN2	6	1	4,000	6 weeks	1	5 days
		3	1-1.2	6,000	12 weeks	-	—
		4	1-1.2	6,800	12 weeks	-	—
		4	1.3	6,800	1 day	-	—
		3	1.3	6,800	2 weeks	-	—
		4	1.3	6,800	4 weeks	-	—
IV	HN2 and radiation	5	1	4,000	2-4 weeks	-	—
		4	1-1.2	6,000	8-12 weeks	-	—
		2	1-1.2	6,800	8-12 weeks	-	—
		4	1.3	6,800	1 day	-	—
		4	1.3	6,800	1 week	-	—
		4	1.3	6,800	2 weeks	-	—

Comment.—These studies in the rabbit do not bear out the impression that there is necessarily an increased morbidity or a diminished tolerance resulting from a combination of the two forms of therapy. If the animal recovers from either one of them, the subsequent use of the other one, within its appropriate dosage range, is not lethal. The animals which survived both forms of therapy by a matter of several weeks revealed minimal, if any, histologic changes in the tissues involved.

It must be pointed out that such findings actually do not pertain to whether or not these agents are more *effective* when used together in contrast to the use of either of them alone; this study simply bears on the question whether or not, from the point of view of morbidity or of lethal impact, the two of them are additive. From the point of view of treating with mustard the patient presumed to be at tolerance to radiation therapy, this latter question is vital.

Summary

A group of 20 patients with pelvic malignancies were treated with intra-arterial nitrogen mustard with a one- or two-injection technique to administer the entire dosage.

The patients had cervical, fundal, and ovarian carcinomas but in each instance the lesion had spread beyond the confines of the organ of origin.

Fifteen of these patients had been treated "to tolerance" and had evidences of active recurrence, giving them an exceedingly limited prognosis initially. Five patients were selected for treatment prior to the administration of the radiation.

With 3 of the patients still living—2 without evidence of disease and one with evidence of disease—the average survival for the entire group is approximately twelve months. The posttreatment morbidity was considerably more marked, however, in the patients whose radiation had preceded the administration of the HN2.

The animal studies using rabbits failed to indicate an increased mortality rate when sublethal doses of radiation and mustard were used together without regard for the sequence of administration or the time interval.

Clinically, it is not felt that this particular technique of mustard administration yields enough benefit, even in the far-advanced pelvic malignancies, to merit the risk of morbidity which it entails.

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OVARIAN MALIGNANCY*

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THE ovary, by virtue of its germinal epithelium, has the inherent potential for the development of structures whose cells vary from the very embryonic to the extremely matured. These cells may take on the structure and characteristics of any one part or several or all parts of the human body. In the normal course of events, the biologic and physiologic patterns conform and the cells develop normally. When aberrant or pathologic behavior influences the cellular growth and construction, benign or malignant neoplasms can result.

The ovary at every age can be the source of neoplasms. These are very rare in the infant and child. It is recognized that the incidence of benign tumors increases gradually from early adulthood until well into the latter half of menaemic life. It is said to reach a plateau before the menopause and to decline afterward. By the time benign tumors have reached their greatest frequency by age, malignancy of the ovary has begun a rapid increase in occurrence. Thus the fourth decade marks the first appreciable frequency. The sixth decade becomes the most dangerous age for this condition, after which there seems to be a slight favorable decline.

In contrast to most cervical and uterine malignancies, ovarian cancer does not offer early signals or warning. Unlike mammary or testicular malignancy there is not the opportunity for the patient to palpate periodically for nodules or changes. The ovary like the lung and stomach is comparatively inaccessible for examination and is totally hidden from the individual. Malignant growths of the ovary, like many malignancies, grow quietly and insidiously, threatening the life of the host.

A complete review of current literature was intentionally avoided since the purpose of this communication was to investigate the diagnosis, treatment, and results of ovarian malignancy at this institution. For comparison, only a few of the many excellent articles have been listed.

All reports present a discouraging outlook for those with malignant gonadal neoplasms. The most favorable report (Table I) of 5 year survivals was given as 35 per cent by Allen and Hertig,[1] while O'Donoghue[10] had but a mere 9.3 per cent survivals. Gardner and Slate,[5] Benson, Sherman, and Lucia,[2] and Wheelock, Fennell, and Meigs[14] reported their respective 5 year survivals as 35, 32, 30, and 26 per cent. Mengert[9] in his study of 56 patients had but 11 per cent who reached the 5 year mark, while Diddle[3] with 294 patients had

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21 per cent 5 year survivors. Witterdal,[13] Schmitz and Majewski,[12] Pearse and Behrman,[11] and McCartney and associates[4, 7, 8] had 20 per cent or slightly more live 5 years following therapy. Thus the prognosis for ovarian carcinoma in any case is poor, and hopelessly grave for an overwhelming majority.

TABLE I. COMPARISON OF SURVIVAL RATES

AUTHORS	NO. OF CASES	5 YEAR SURVIVAL (%)
O'Donoghue, New Zealand	100	9.3
Mengert, Southwestern Medical School	36	11.1
Witterdal, Stockholm	117	20.0
Schmitz and Majewski, Mercy Hospital, Chicago	143	20.3
McCartney et al., Chicago Lying-in Hospital	128	20.3
Pearse and Behrman, University of Michigan	277	20.6
Diddle, Southwestern Medical School	294	21.3
Wheelock et al., St. Vincent's Hospital, Boston	67	26.6
Benson et al., University of California	137*	30.0
Gardner and Slate, College Med. Evang.	96	32.3
Allen and Hertig, Harvard University	265	35.0

*Papillary cystadenocarcinoma only, serous and pseudomucinous.

Although there are similarities, the above reports were not tabulated on exactly the same standard. One or two individuals based their rates upon only those patients who were satisfactorily followed. Like most of the other authors McCartney and his associates[4, 7, 8] (Chicago Lying-in Hospital) made no deletion or correction. Only those known to be alive at 5 years or later were calculated against all of the others.

Material

Since the opening day of the Chicago Lying-in Hospital, May 25, 1931, to June 30, 1954, 838 patients with malignancy of the genital apparatus (excluding chorionepithelioma) have been observed (Table II). These data were compiled and offered to us by McCartney[7] and McCartney and Dieckmann.[8] During the earlier years of the hospital only a comparatively few patients with gynecologic problems came for care as the institution was known then as a maternity rather than a women's hospital. Over the past several years the gynecologic service has expanded gradually but considerably. For instance in 1953 there were 1,802 gynecologic operative procedures which amounted to a 256 per cent increase in one decade. This increase explains the greater number of malignancies diagnosed and treated in the past few years.

TABLE II. GYNECOLOGIC MALIGNANCIES

	INCIDENCE		FOLLOW-UP	5 YEAR SURVIVAL	
	NO.	%*	%*	NO.	%*
More Common Carcinomas.—					
Uterus:					
Cervix	416	49.5	71.0		26.8
Corpus	216	26.0	85.0		43.0
Ovary	128	15.27	76.0	26	20.3
Vulva	33	3.9	69.0		8.0
Less Common Carcinomas.—					
Fallopian tube	11	1.3	100.0		27.3
Vagina	7	0.83	100.0		0.0
Bartholin gland	1	0.12	100.0		0.0
Undetermined origin	22	2.6	78.0		0.0

*% of all malignancies.

Of the 838 gynecologic carcinomas for which care was given prior to July 31, 1954, 128 were ovarian in origin, an incidence of 15.37 per cent of all gynecologic malignancies. It has been concluded that 75 of these patients have been followed satisfactorily since their admission to our institution. This follow-up included (a) those who are alive at the present time, but for less than 5 years, (b) those who survived 5 years and/or longer (still living or followed until death after 5 years), and (c) those followed until death prior to the lapse of 5 years. Two patients furnish an example of the error of cure on basis of years alone as a standard. One patient was followed for over 6 years before death, and the second for a full 15 years. Both of these were proved by autopsy examination to have died from carcinoma of the ovary. Standards of 5 or 10 years are yardsticks, however, and some method of measure must be used. The percentage of all patients with ovarian carcinoma who are alive or have survived 5 years was 31 per cent plus (or 40 patients). Of these, 14 patients (or 10.9 per cent) have lived at least 2 years or more, but have not yet attained the 5 year measure. Thus there remain 26 patients (or 20.3 per cent) in the 5 year survival group.

Other Genital Malignancies

A quick comparison with the malignancies of the other structure of the genital apparatus permits some encouragement for future progress. There were 416 carcinomas of the cervix and cervical "stump," which comprise 49.5 per cent of the gynecologic malignancies. A follow-up was maintained in 71 per cent. The 5 year survival for all stages amounted to almost 27 per cent. There were 216 carcinomas of the corpus, or 26 per cent of all these malignancies, for which a follow-up of 85 per cent has been maintained and 43 per cent of these are known to have survived 5 years and more. Carcinoma of the vulva occurred 33 times, or in approximately 4 per cent of the patients. The follow-up was successful in 69 per cent with only 8 per cent surviving for 5 years. Cancer of the Fallopian tube was found in 11 patients, an incidence of 1.3 per cent, with a 5 year survival rate of 27 per cent. As judged by other reports it is doubtful that this percentage can be maintained for this type has been thought to offer a very poor prognosis. Cancer of the vagina occurred 7 times without 1 survival for 5 years. Cancer of the Bartholin gland occurred once, without survival for 5 years. A total of 22 patients (or 2.6 per cent) had carcinoma from some source in the pelvis, the origin of which could not be determined at the time of operation or by histologic study of the biopsy samples. As would be expected, not one of these 22 patients survived for any period of time.

Sarcoma (Table III) was found in 7 cases, 6 in the uterus and 1 in the ovary. Only 30 per cent of the patients with uterine sarcomas survived for 5 years. The one patient with the ovarian sarcoma was short lived.

TABLE III. SARCOMA

	INCIDENCE		FOLLOW-UP	5 YEAR SURVIVAL
	NO.	%	%	%
Uterus	6	0.71	100.0	50.0
Ovary	1	0.12	100.0	0.0

Complaints or Symptoms

The 128 patients with ovarian carcinoma had 189 principal or major complaints (Table IV). A moderate number had 2 or more disturbing symptoms which accounts for the imbalance in the numbers. These complaints are listed

in descending order of frequency: abdominal pain in 32 per cent, abdominal enlargement in 27 per cent, palpable mass discovered by the patient in 23 per cent, abnormal vaginal bleeding in 22 per cent, urinary symptoms in 12 per cent, with the other less frequent symptoms decreasing, and in 2 patients (1.6 per cent) there were no pelvic symptoms. These 2 ovarian malignancies were found during the course of treatment of other conditions. Golub[6] found abdominal enlargement occurring in over half of his patients, while approximately 40 per cent had abdominal pain and about 33 per cent had abnormal bleeding. Witterdal[13] recorded abdominal pain in 40 per cent of his patients, bladder distress and symptoms in 41 per cent, weight loss in 36 per cent, abdominal enlargement in 31 per cent, and abnormal vaginal bleeding in 19 per cent.

TABLE IV. CARDINAL COMPLAINTS OR SYMPTOMS (189) IN 128 CASES OF OVARIAN CARCINOMA

	NO.	%
Abdominal pain	41	32.0
Enlargement of abdomen	35	27.4
Abdominal mass found by patient	30	23.4
Abnormal vaginal bleeding	29	22.7
Urinary symptoms	16	12.4
Abdominal pressure, bloating	9	7.0
Vaginal discharge	9	7.0
Nausea, vomiting	6	4.7
Constipation	7	5.5
Backache	5	4.0
No symptoms found on examination	2	1.6

Age and Incidence

Age has been considered important in the development of malignancy (Table V). For instance, Pearse and Behrman[11] had patients whose ages varied from 13 years to 104. The group in this study ranged from the age of 18 to over 70. Three-fourths of the cases occurred between 30 and 59 years, inclusive. The greatest number and per cent came in the decade 50 to 59 years, 32 per cent of the entire series. Eighteen per cent in the fourth decade increased to 25 per cent in the fifth decade and decreased in the seventh decade to about 15 per cent. This was in accord in part with the contention that ovarian carcinoma occurred during a phase of or after the menopause. Actually 23.5 per cent of this series involved individuals 39 years of age and younger.

TABLE V. AGE INCIDENCE IN OVARIAN MALIGNANCY

AGE (YEARS)	NO.	%
18-19	2	1.6
20-29	4	3.2
30-39	24	18.7
40-49	33	25.8
50-59	41	32.0
60-69	19	14.8
70 and over	5	4.0

Types of Malignancies

A number of types or classifications of ovarian malignancy have been given in the recent literature. McCartney's material falls into 9 categories (Table VI). These types and percentages were cystadenocarcinomas 53, pseudomucinous cystadenocarminoma 14, Krukenberg 8.6 (not necessarily a true ovarian carcinoma by some standards), granulosa cell 5.5, solid adeno-

carcinoma 4.7, malignant teratoma 1.6, sarcoma 0.8, dysgerminoma 0.8, and an unclassified group 10.1. Gardner and Slate[5] found cystadenocarcinoma in 56 per cent, solid adenocarcinoma in 30 per cent, and pseudomucinous cystadenocarcinoma in only 2 per cent. Schmitz and Majewski's[12] figures varied in the following manner: serous cystadenocarcinoma 48 per cent, pseudomucinous cystadenocarcinoma 10 per cent, solid ovarian malignancies 24 per cent.

TABLE VI. TYPES OF OVARIAN MALIGNANCIES

	NO.	%
Serous cystadenocarcinoma	69	53.8
Pseudomucinous cystadenocarcinoma	18	14.1
Krukenberg	11	8.6
Granulosa cell	7	5.5
Solid adenocarcinoma	6	4.7
Malignant teratoma	2	1.6
Sarcoma	1	0.8
Dysgerminoma	1	0.8
Unclassified	13	10.1

Duration of Symptoms

Symptoms were present for less than 6 months in 65 per cent of the patients, while the longest duration of symptoms was over 4 years (Table VII). It seems probable that those who had symptoms for many months or a few years did not have ovarian malignancies initially. It is most improbable that a patient with an untreated ovarian carcinoma would live for 4 years without seeking care long before (if the general concept of this disease is correct). Allen and Hertig[1] emphasize the point that those who had symptoms of the shortest duration prior to the establishment of diagnosis had a poorer prognosis. There is no good explanation save that the longer duration of symptoms could indicate a less malignant disease.

TABLE VII. DURATION OF SYMPTOMS BEFORE ESTABLISHMENT OF DIAGNOSIS

	NO.	%
Less than 6 months	84	65.6
6-12 months	15	11.7
12-24 months	12	9.3
24-36 months	2	1.6
36-48 months	3	2.3
Over 4 years	3	2.3
Indefinite	7	5.5
No symptoms	2	1.6

Time of Diagnosis

The diagnosis was made in 25 per cent of the group in other institutions, that is, before arrival at this institution (Table VIII). The diagnosis was logical in 34 per cent before operation. The clinical diagnosis was made at the time of operation in 29.7 per cent. In 14 patients, or 11 per cent of the entire group, a diagnosis was made in the laboratory of pathology. It was of particular interest that 91 patients (71.1 per cent) had gross implants and metastases at the initial operation. This means that only 37 individuals, or 28.9 per cent, had macroscopically localized lesions. Obviously some had cell implants too small to be observed. Allen and Hertig had but 52 per cent with gross metastases or extensions at the time of exploration. This offered a better prognosis for their series, and indicated that their patients came for care earlier in the course of disease.

TABLE VIII. RELATION OF TIME OF DIAGNOSIS TO OPERATION AND FREQUENCY OF SPREAD

	NO.	%
Diagnosed elsewhere	32	25.0
Before operation	44	34.3
Time of operation	38	29.7
Pathologic report, unsuspected	14	11.0
Total	128*	

*Thirty-seven, or 28.9 per cent, were localized at time of operation.

Survival Times or Longevity

Survival has varied with the series. This series has had a variable range (Table IX). Some 18 per cent survived less than 6 months, 3 per cent for 6 to 12 months, 8 per cent for 12 to 24 months, 5.5 per cent for 2 to 3 years, 3.2 per cent for 3 to 5 years, and 20 per cent for 5 and more years. Follow-up was incomplete in 30 per cent. The two most frequent ovarian lesions were serous cystadenocarcinoma (53.8 per cent) and pseudomucinous cystadenocarcinoma (14.1 per cent). The former (Table X) was localized in 30 per cent of the cases with a 5 year survival rate of 38 per cent. The 5 year survival in the 70 per cent with extension was but 10 per cent. Of the 18 pseudomucinous cystadenocarcinomas, 7, or 39 per cent, were grossly localized, with a 5 year survival of 5, or 71 per cent (Table XI). Extension was obvious in 61 per cent, with a 5 year survival of 18 per cent. The over-all 5 year survival in all ovarian malignancies was 20 per cent (Table XII). This was near but slightly below the average 5 year survivals reported. Most probably the variability in patient response to symptoms explains the differences in results.

TABLE IX. SURVIVAL TIME

	NO.	%
Under 1 year	28	21.9
1 to 2 years	10	8.0
2-3 years	7	5.5
3-4 years	2	1.6
4-5 years	2	1.6
Over 5 years	26	20.3
Living, under 5 years	14	10.9
Incomplete follow-up	39	30.4

TABLE X. SURVIVAL RATE IN 69 PATIENTS WITH SEROUS CYSTADENOCARCINOMA

	AT OPERATION			
	LOCALIZED		SPREAD	
	NO.	%	NO.	%
Number	21	30.0	48	70.0
5 year survival	8	38.0	5	10.5
Living, under 5 years	5	24.0	1	2.0
Dead	1	5.0	30	62.0
Incomplete follow-up	7	33.0	12	25.0

TABLE XI. SURVIVAL RATE IN 18 PATIENTS WITH PSEUDOMUCINOUS CYSTADENOCARCINOMA

	AT OPERATION			
	LOCALIZED		SPREAD	
	NO.	%	NO.	%
Number	7	39.0	11	61.0
5 year survival	5	71.0	2	18.0
Living, under 5 years	1	15.0	2	18.0
Dead	0	0.0	6	54.0
Incomplete follow-up	1	15.0	1	9.0

TABLE XII. FIVE YEAR SURVIVAL RATE IN ALL WHO CAME TO THE INSTITUTION

	%
Serous cystadenocarcinoma	18.8
Pseudomucinous cystadenocarcinoma	38.9
All ovarian malignancies	20.3

Comment

Two major problems of ovarian carcinoma still loom before us. One is the substitution of early diagnosis for late and the other is the urgent need for vast improvement in therapy. An appreciable advance on either front might do miracles toward improving the prognosis in malignancy of the ovary.

Surgical removal prevails as the only choice, since irradiation has failed miserably as a curative agent. Irradiation is an adjunct subsequent to surgery, especially for retarding the growth or spread of peritoneal implants, and retarding the development of ascites. Some patients have had remarkably favorable response to such treatment.

A fundamental principle stands out: Aspiration of cysts and rupture of the tumor during its removal should be carefully avoided, for a leak contributes to a more rapid dissemination of free malignant cells.

The diagnosis of gonadal malignancy becomes most probable with the finding of typical malignant cells in aspirated fluid. Other organs so involved can produce ascitic fluid. Surgical exploration with full removal of the gonadal mass or masses should be attempted. Biopsies of implants are necessary for histologic classification. The removal of the ovarian growths (the mother site) in the presence of metastatic lesions has offered a moderate number of patients remarkable improvement. This reprieve may last for a few months to a number of years. The use of deep x-ray therapy postoperatively may retard or even arrest the production of ascitic fluid. The removal of the mother sites may remove mechanical pressure over the large veins which may have caused dependent edema. The effort to remove a *single* or a *few* metastatic nodules is in order if the lesions are within reach and have not involved a vital structure to the extent that damage from surgical removal would produce a serious complication. The attempt to remove numerous implants has been unjustified in view of past experiences.

The following case report has points of interest:

One patient in our series has had a dramatically unbelievable course. The lesion was a pseudomucinous cystadenocarcinoma of both ovaries. Briefly, the patient had been treated by deep x-ray therapy after an abdominal exploration and biopsy in another institution. She had had 96 abdominal paracenteses in about one year's time prior to admission to this service. There was marked edema of both legs. Since the prognosis appeared hopeless as the situation was, the abdominal cavity was explored. Numerous metastatic implants were spread over the parietal and visceral peritoneum. The two large ovarian masses were removed. Their weight was about 6 pounds together. The leg edema subsided promptly. About 10 more deep roentgen-ray treatments to the abdomen generally arrested the formation of ascitic fluid. This patient has remained well (now aged 44) and active for over 5 years since the surgical removal of the ovarian masses (or about 6½ years since the known presence of the disease). A review by Dr. Potter of all

"slides" confirms the original diagnosis of pseudomucinous cystadenocarcinoma of the ovary. An examination within the last month showed the patient free from any clinical evidence of recurrence.

Diagnosis

The review of data of this type points discouragingly to the infrequent early diagnosis. The fact that symptoms arise ordinarily after the disease is moderately or well advanced accounts for failure to seek medical counsel earlier. Another utterly discouraging fact is that histologic change must take place before the diagnosis can be made. Also the fact that the female gonad is small and well protected in the pelvis makes bimanual examination ordinarily the only tool for evaluation. The uncertainty of minor changes in size, due to the masking by the other viscera and the abdominal wall, and the interpretation of normal physiologic changes in association with ovulation contribute to the dilemma.

Examination of the ovary at the time of intra-abdominal operation should aid in an occasional early detection of neoplasm. Unfortunately, many excellent abdominal surgeons are not schooled in the recognition of minor but important changes between the normal and pathologic states of the ovary.

Certainly a complete physical examination must include a vaginal examination (or rectal if vaginal examination cannot be made). Any uncertain finding in the adnexa should be re-evaluated within a few days, after the bowel and bladder have been emptied.

Abnormality of borderline nature might justify examination under anesthesia. Individuals at the menopause or past should, if any doubt exists, be subjected to an exploratory laparotomy. Cases found before extension are the ones for which the greatest hope of cure exists.

Prevention has been a theme in medical practice for a number of years. Even so there is but one preventive measure available and that is the removal of the gonads prior to the development of malignancy. A moderate controversy prevails today on the merits and demerits of removal of normal ovaries prior to and even after the menopause. It is the general policy at the Chicago Lying-in Hospital to remove the gonads in women 40 years of age or older when the uterus is removed. Menopausal symptoms do disturb some patients, but these can be relieved by estrogens orally or hypodermically and by sedatives. Emotional preparation before operation is a valuable psychological bridge. There is no reliable evidence that the ovary serves any useful function after the menopause. Thus a diseased ovary should not be left in the body at this age period. If the practice of removal of both ovaries in association with hysterectomies in women over the age of 40 were general across the United States the incidence of ovarian carcinoma would be reduced percentagewise in a cross section of the female population.

Treatment

Surgical extirpation has been the most productive of cures. Deep x-ray therapy and isotopes and male hormones have not been curative in any sig-

nificant sense. These nonsurgical agents may be employed for supportive purposes subsequent to operation, to prolong life and to inhibit the growth of metastatic lesions.

Conclusion

As judged by other reports, cancer of the Fallopian tube and vagina responds less well to therapy than ovarian cancer. The cure rate of tubal and vaginal cancer is extremely low.

Ovarian carcinoma is the third most frequent genital malignancy. Early surgical removal offers the best cure rate. For some reason, when metastasis has occurred, the removal of the mother site or primary site (the ovaries) seems to prolong life and make it useful and more comfortable.

Earlier, and better diagnostic methods must be developed. It is equally essential that a specific therapy be established. There is no point in accepting a fatalistic attitude. Progress is made only by trying and trying again, in the face of all adversities. All facts imply that success will come. For this success, repeated clinical studies, additional laboratory evaluation, and tests of newer agents must continue.

We wish to give full credit to Drs. Charles P. McCartney and Wm. J. Dieckmann of this department for the data from the Chicago Lying-in Hospital.

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TRICHOMONAS VAGINALIS INFECTION IN POSTMENOPAUSAL WOMEN*

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IN THE numerous publications on *Trichomonas vaginalis* infections in women (see Trussell[1] for a survey of the literature) attention has been focused exclusively on women of childbearing age. Scant mention is given to the occurrence of this flagellate in patients of menopausal and postmenopausal age. Generally it is regarded as occurring less frequently in older women. Jírovec and associates[2] diagnosed 4 positive cases among 31 gynecologic patients aged 50 to 70 years, and Geiger[3] found 2 cases in 13 patients between the ages of 50 years and over. Indeed Lang and Rakoff[4] did not note any cases in women beyond the age of 60. In a recent survey[5] of 859 women in the various age groups, however, I have found 65 patients harboring *Trichomonas vaginalis* among 504 aged 50 to 91 years. Of the 65 positive patients 24 were beyond 60 years of age.

It is the purpose of this paper to present the findings in these patients.

Materials and Methods

The cases were collected from the routine medical clinic of the Jefferson Medical College Hospital. None of the patients had deemed it necessary to register with the gynecologic department. But close questioning and examination revealed obvious gynecologic disorders in some of the women. These conditions were evaluated with reference to the final data. The race, age, year of menopause, vaginal symptoms and signs were recorded for each patient. Recent hormonal therapy and the practice of douching also were noted in each instance.

Of particular interest were the 24 Trichomonas-positive patients beyond the age of 60 years. In these cases a more detailed investigation was completed. Following a thorough examination of the lower genital tract, the special studies which were then made included preparation of wet mounts and Gram-stained smears of the vaginal discharge and examination for parasites, cellular content, and bacterial flora; vaginal smears stained by the Papanicolaou technique for cytologic study; routine cultures for identification of the bacteria associated with *Trichomonas vaginalis,* employing standard laboratory methods; direct determinations of the pH of the mid-vaginal mucosa by the glass electrode method; punch biopsies of the vagina for routine histologic study and glycogen content as stained by the Best-carmine method,[6] and 24 hour urine specimens assayed for estrogens, gonadotropins, and 17-ketosteroids.[7]

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Results

The present observations are based on the examination of 504 medical patients between 50 and 91 years old. Of the number 312 were white and 192 were Negro women. The age distribution is summarized in Tables I and II. In the total series 65 patients were positive for *Trichomonas vaginalis*. The highest incidence of infection occurred in the age groups between 50 and 59 years. Eight (9.4 per cent) of the 85 white women and 32 (15.1 per cent) of 86 Negro women were positive. These cases presented the same variable picture of infection as is found in younger women. *However, in the age groups 60 years and beyond there were 2 white and 22 Negro patients harboring the flagellate.* These are the cases of interest and attention now is directed to them as a group.

TABLE I. FREQUENCY OF TRICHOMONAS VAGINALIS IN POSTMENOPAUSAL WHITE WOMEN

AGE	NO. OF PATIENTS	NO. YEARS SINCE LAST MENSTRUAL PERIOD	NO. WITH *T. vaginalis*	NO. WITH SYMPTOMS
50-54	35	2-5	5	1
55-59	50	3-5	3	1
60-64	78	--	--	--
65-69	74	--	--	--
70-74	44	20-23	2	0
75-79	24	--	--	--
80-84	5	--	--	--
85-89	1	--	--	--
90-94	1	--	--	--
Total	312		10	2

TABLE II. FREQUENCY OF TRICHOMONAS VAGINALIS IN POSTMENOPAUSAL NEGRO WOMEN

AGE	NO. OF PATIENTS	NO. YEARS SINCE LAST MENSTRUAL PERIOD	NO. WITH *T. vaginalis*	NO. WITH SYMPTOMS
50-54	48	1-12	15	10
55-59	38	2-13	18	14
60-64	50	13-20	9	6
65-69	32	16-20	8	5
70-74	18	20-30	4	2
75-79	5	?	1	0
80-84	1	?	--	--
Total	192		55	37

Of these 24 positive patients 13 were symptomatic. They complained of a slight-to-moderate discharge with resulting irritation and pruritus. All practiced lavage with relief. In contrast to the infection in the younger age groups the symptoms and signs were comparatively mild.

In the more severe cases, examination showed an inflamed vaginal outlet and a diffuse inflammation of the cervicovaginal mucosa with punctate areas of hemorrhage and at times excoriations. The pH of the mid-vagina varied from 5.5 to 7 with an average of 6. The discharge varied from the typical mucopurulent, frothy kind (1 case) to a thin, grayish type. Wet-mount preparations of the discharge showed moderate numbers to many trichomonads and leukocytes, with variable numbers of intermediate and basal-layer cells. In 9 patients, the latter cells were predominant, in keeping with the more severe atrophic changes in the vaginal membrane. In such instances it was difficult to differentiate between the changes resulting from an atrophic vaginitis alone and a superimposed *Trichomonas vaginalis* infection. The lat-

ter condition, however, was accompanied by the trichomonads, an increase in vaginal discharge, and a symptomatic cure of the patient by the simple expediency of douching. The Gram-stained vaginal smears revealed a Grade III flora with many gram-positive cocci and rods and few to moderate numbers of gram-negative rods. The bacteria cultured in order of frequency were, *Staphylococcus aureus, Streptococcus hemolyticus, Streptococcus nonhemolyticus,* diphtheroids, *Streptococcus viridans, Escherichia coli, Staphylococcus albus,* Friedlander's bacillus (1 case) and *Clostridium perfringens* (1 case).

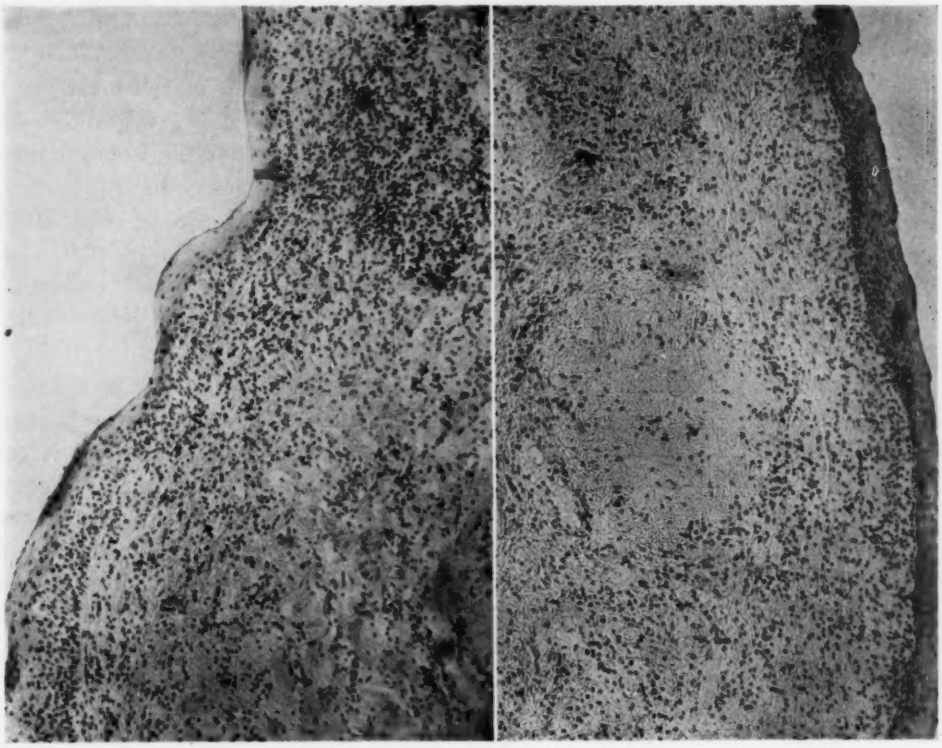

Fig. 1. Fig. 2.

Fig. 1.—(No. X66537.) White patient, aged 74, menopause twenty years previously. Biopsy taken from case of trichomoniasis; note area of leukocytic infiltration. This histopathologic picture is not distinguishable from senile vaginitis. (×100; reduced ⅙.)

Fig 2.—(No. X38270.) Negro patient, aged 73, menopause thirty years previously. Biopsy taken from case of trichomoniasis. Note normal postmenopausal epithelium and subepithelial tissues. (×100; reduced ⅙.)

In the 24 cases under review the interval since the menopause was from 13 to 30 years. In such patients the vaginal smears showed moderate regressive changes to marked deficiency of estrogen effect. But in many instances the estrogen evaluation was rendered questionable because of the marked inflammatory reaction and the presence of the trichomonads. Nevertheless the biopsies (Figs. 1 and 2) from the vaginal walls showed the characteristic thin epithelium and paucity or absence of glycogen distribution. Infrequent leukocytic infiltration of the subepithelial layers and necrosis of the superficial epithelium were noted. Furthermore, this estrogen deficiency was demonstrated by the hormonal assays. These showed the quantitative urine estro-

gens to be less than 12 mouse units per 24 hours and the gonadotropins over 96 mouse uterine-weight units per 24 hours. The ketosteroids varied from 2.1 to 4.0 mg. per 24 hours.

Comment

A difference of opinion has arisen with regard to the role played by the estrogens in the etiology of *Trichomonas vaginalis* vaginitis. In general, clinicians have noted the rarity of this infection in infants and children, the high incidence in sexually mature and pregnant individuals and the tendency of the infection to decrease with diminishing estrogen function. This has led some observers[8, 9, 10] to believe that the estrogenic effect may favor the infection. That the estrogens play this role in the pathogenesis of the infection is refuted by Chappaz[11] and others.[12-16] To support their belief they have observed the premenstrual cyclic appearance of the trichomonads, a low karyopyknotic index in stained vaginal smears, and the frequency of infection in patients with ovarian deficiencies. The observations in the present study seem to substantiate further the latter premise. *Trichomonas vaginalis* was found in patients well beyond the menopause, and in a state of marked hypoestrogenism. The flagellate survived the environmental conditions of the resulting atrophic vagina.

As is known, the distinctive feature of the latter condition is the thin epithelium which is readily traumatized. This gives rise to a serum transudate. I believe that the serum, whatever its original source, with or without its complement of inflammatory exudate, propagates the flagellates. Serum or whole blood is an essential ingredient of every successful culture preparation.[1] Therefore conditions which alter the normal histologic physiology of the genital tract, the vagina in particular, and result in serum transudation, are necessary for the implantation and survival of *Trichomonas vaginalis.* It must be remembered that the organism itself gives off a toxic substance which causes degeneration of epithelial cells.[17] Moreover, in the presence of a carbohydrate, such as glycogen, or bacteria—*Staphylococcus aureus* for example—the metabolism of *Trichomonas vaginalis* will be greatly enhanced[18] and a latent infection then may become manifest.

Summary

1. In a series of 504 patients aged 50 to 91 years attending a routine medical clinic, 65 women were positive for *Trichomonas vaginalis.*

2. In the age groups 60 years and beyond *Trichomonas vaginalis* was found in 2 of 227 white women and 22 of 106 Negro patients examined.

3. Attention was drawn to the comparatively mild symptomatology.

4. The relation between *Trichomonas vaginalis* infection, postmenopausal age, and deficiency of estrogen effect was discussed.

5. Some evidence was presented in support of a theory that the implantation and survival of *Trichomonas vaginalis* in the vagina are the result of the serum present.

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ADDISON'S DISEASE AND PREGNANCY

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PRIOR to the advent of such compounds as desoxycorticosterone acetate (DOCA) and 17 hydroxy-11-dehydrocorticosterone (cortisone), Addison's disease complicated by pregnancy was frequently fatal, as is noted in reviewing past literature.[1-4]

Hendon and Melick,[5] in a very recent report, recognized approximately 60 cases of pregnancy in Addison's disease. Of these, 14 pregnancies have occurred in the past five years when potent adrenal cortical hormones have been available. They added one case of their own which they followed through a successful pregnancy. To this small number of pregnancy patients reported suffering from Addison's disease in whom pregnancy terminated successfully, we would like to present the following case of a patient who had Addison's disease for some five years prior to her pregnancies.

Case Report

Mrs. N. W., a 30-year-old white woman, was first seen on July 7, 1950, complaining of pigmentation of the skin and generalized weakness, which had been increasing for six weeks prior to her first visit to the office. She had become extremely weak, had a poor appetite, and had marked constipation. Her menstrual periods had been regular, although scanty, and she had lost 15 to 20 pounds in weight. Family history revealed that one brother had tuberculosis, but the patient had had repeated x-rays through the years, none of which had shown any evidence of pulmonary tuberculosis. She had one daughter living and well, aged 13 years.

Physical examination showed a blood pressure of 100/60; pulse, 80; temperature, 98° F.; weight, 97 pounds. The general appearance was that of a chronically ill white woman with very marked dark brown generalized pigmentation of the skin. The mucous membrane of the mouth, however, showed no pigmentation. The remainder of the physical examination was essentially negative.

Laboratory findings were within normal limits except for a hemoglobin of 70 per cent. X-ray of the chest was negative; x-ray of the abdomen showed no calcification in the area of the adrenal glands. A tuberculin test was faintly positive.

She was placed on desoxycorticosterone, 5 mg. intramuscularly, and sodium chloride tablets, 6 Gm. daily. Because of edema, the dose was lowered to 5 mg. of desoxycorticosterone intramuscularly twice a week. Definite improvement was noted on this treatment, and after a few weeks she was able to do her own housework. As she lived some distance away, Cortate, 2 mg. twice a day orally, and sodium chloride, 6 Gm. daily, were

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instituted. She was seen at two- to three-week intervals over the next few months and continued to improve gradually. Slight anemia persisted in spite of antianemia therapy. On July 21, 1951, cortisone was started at which time her weight was 107 pounds, blood pressure 110/70. The dosage of cortisone was 25 to 50 mg. daily in divided doses. The response was quite good, the pigmentation decreased even more, and her strength was greater than it had been for several years. In general, the patient did quite well except that she seemed to have a reduced resistance to colds and had frequent gastrointestinal upsets with nausea, vomiting, and diarrhea; one of these episodes in April, 1952, required hospitalization.

On May 19, 1953, 225 mg. of desoxycorticosterone was implanted in the back without incident except for slight swelling of the feet and hands. Sodium chloride was discontinued and the swelling subsided. Again, the patient was able to vary her dose of cortisone and sodium chloride so as to maintain herself fairly well.

On May 21, 1954, she was seen for a routine visit, but her complaint at that time was that she had not menstruated since March 1, 1954. Prior to that time, her menstrual periods had been quite regular. She had had considerable nausea and weakness for several weeks. Vaginal examination disclosed an enlarged uterus which had a small irregularity of one side. The impression was: (1) uterine pregnancy with the expected date of confinement on or about Nov. 15, 1954, and (2) myoma of the uterus.

Her prenatal course was normal, and the pigmentation gradually decreased until at the time of delivery her complexion was almost of normal color. During the last trimester of pregnancy, she did not require salt or cortisone. One week prior to delivery, she had two plus edema of the ankles; and salt was further restricted from her diet and a diuretic was given intramuscularly, which controlled this very well.

She went into spontaneous labor on the evening of Nov. 20, 1954, and at the time of her admission she was given 200 mg. of cortisone intramuscularly and 1,000 c.c. of saline solution intravenously. After a three-hour labor, she delivered a viable male infant spontaneously under cyclopropane anesthesia without event. Both the mother and the baby left the delivery room in good condition. During her postpartum stay at the hospital, she received cortisone and saline daily and was dismissed from the hospital on cortisone and sodium chloride tablets.

Follow-up examinations of the patient showed only slight edema of the lower extremities, which has now subsided and is giving her no difficulty. She was last seen in the office on July 2, 1955, weighing 112 pounds. The only complaint she presented at that time was that her last menstrual period had occurred on May 20, 1955; and pelvic examination disclosed that the patient was pregnant again.

Comment

This case presents several interesting points, namely: (1) the lack of complications during the prenatal, labor, and postpartum periods; (2) a decrease in the pigmentation of the skin during pregnancy, and the subsequent increase in pigmentation following the postpartum period; (3) the seemingly increased fertility of a patient with Addison's disease under cortisone therapy. The patient had one pregnancy 13 years prior to her initial visit. During the four years on cortisone, she has become pregnant twice.

To substantiate the diagnosis in this case, an eight-hour intravenous ACTH test was done. The eosinophils showed no significant drop. Seventeen-ketosteroid determination, likewise, showed no increase after ACTH.

Since cortisone has become available, the therapy of Addison's disease is somewhat comparable to therapy of other diseases produced by the hypofunction of the glands of internal secretion such as hypothyroidism, diabetes mellitus, etc.

In the uncomplicated case of Addison's disease in pregnancy, therapy may be rather well standardized. Cortisone, 100 to 200 mg., should be given upon admission to the hospital for delivery. Additional cortisone is given depending upon the length and progress of labor. A fall in blood pressure and even shock may occur in the twenty-four hours following delivery. This is the time of the greatest danger, and the patient should be observed closely with frequent determinations of blood pressure. Cortisone, 50 mg. each six hours, should be given for forty-eight hours postpartum. The dose may then be gradually decreased. In cases of impending pre-eclampsia with fluid and electrolyte imbalance in the presence of albuminuria and hypertension, treatment may be more involved. We believe these cases must be evaluated carefully and treated individually, especially during labor and the immediate postpartum period.

Summary and Conclusions

The prenatal and postpartum courses and delivery of a patient with Addison's disease were quite uneventful.

A decrease in the pigmentation of the skin was noted during pregnancy but an increase occurred following delivery.

Cortisone therapy may indirectly increase fertility in Addison's disease.

Although the outlook for a pregnant patient with Addison's disease is much better than it has been in the past, we still feel that each case must be individualized. Each case in itself presents still a very grave problem and should be handled jointly by the obstetrician and internist, and full cooperation must be secured from the patient as well as her family at all times.

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CHOREA GRAVIDARUM*

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ACCORDING to Holt and McIntosh,[1] chorea is a "functional disorder of the central nervous system characterized by sudden aimless, irregular movements, often accompanied by muscular weakness and emotional instability." The choreic patient frequently stumbles, falls, or may drop things. Facial grimaces are prominent. There are spasmodic movements of the arms and legs. These manifestations are exaggerated by excitement, fatigue, infection of toxemia, and tend to be found in patients with emotional instability or psychogenic stimulation.[2]

The following are several tests which might suggest the presence of chorea[1]:

1. Inability to grip the hand—spasmodic contractions are present, instead of a sustained contraction.
2. Pronator sign—raising the arms above the head results in pronation of the forearms so that the backs of the hands are in contact.
3. When asked to smile, the choreic patient assumes a grin, followed rapidly by a tearful or expressionless attitude.
4. "Extension of the arms with hands and fingers outstretched may result in flexion of the wrists and hyperextension of the metacarpophalangeal joints resulting in 'dishing' of the hand (choreic hand)."

The combination of chorea and pregnancy is rather rare. Pregnancy predisposes to acute chorea and favors a relapse in previously choreic individuals.[3] Irving found evidence of chorea in only four out of 39,000 patients delivered at the Boston Lying-in Hospital.[4] Willson and Preece[5] in their very thorough analysis of chorea gravidarum found an incidence of one case in 3,501 pregnancies in the United States. Conversely, they stated that 1.5 per cent of chorea cases are complicated by pregnancy. Of 170 obstetricians who answered questionnaires sent by Willson and Preece, 117 reported that they had not seen a case of chorea with pregnancy.

Because of the rarity of this condition, the following case is reported:

Mrs. L. C., a 25-year-old gravida i, para 0, was first seen on Aug. 4, 1954. Her last menstrual period was May 13, 1954.

Past history revealed several attacks of rheumatic fever, the first time when she was a child, the second at 16 years, and the third time at 20 years. While she was a student nurse she had had an attack of nephritis. Chorea was noted during the attack of rheumatic fever at age 16. Since the last attack of rheumatic fever she had experienced occasional joint pains which were treated with gold therapy and ACTH. In 1947 a tonsillectomy and adenoidectomy and appendectomy were performed.

Physical examination showed a normal adult white woman in no acute distress. There was a loud split first sound over the precordium. The hemoglobin was 12.5 grams per cent. An electrocardiogram showed a sinus mechanism, regular rhythm, and was interpreted as normal.

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Moderate nausea and vomiting with pregnancy were present which were relieved with the usual dry diet routine plus small doses of chlorpromazine by mouth.

First Hospital Admission.—She was first admitted to the hospital on Sept. 13, 1954, with a history of having had a cold and sore throat, associated with malaise and increased nausea and vomiting starting on Sept. 3, 1954. She stated that her temperature was 101° F. on Sept. 10, 1954. There were some right lower quadrant abdominal pains and muscle aches. The patient continued her work as a hospital nurse in spite of the symptoms; but on September 13 she was sent home because she could not walk straight and was dropping things. Her immediate supervisor believed her to be under the influence of either alcohol or narcotics.

Examination showed an apathetic young woman unable to lie in bed with both legs straight. There was a 2 plus rigidity of the neck. Abdominal reflexes were absent. Strength in the arms and forearms was markedly diminished. There was weakness of the leg muscles; the knee jerks were normal bilaterally, however. The left achilles reflex was absent. The cranial nerves seemed to be intact, although there was difficulty in keeping the tongue out on command. When asked to flex her wrists she would squeeze her hands.

Since the patient was admitted to the hospital in the midst of the poliomyelitis season, it was suspected that she might have this disease, and a lumbar puncture was performed. This showed no cells, a pressure of 160 mm. of water, glucose 79 mg. per cent.

The urine examination was negative. A repeat electrocardiogram was normal; the hemoglobin was 11.5 grams per cent; the white blood count was 10,100; the sedimentation rate uncorrected was 16, corrected, 10.

The patient was seen by two consultants in the hospital who thought this was chorea with pregnancy. The temperature remained normal, but muscle weakness and involuntary jerking of the extremities of a mild nature continued. She was unable to feed herself because food would drop off the fork or spoon.

Medication consisted of multiple vitamins, aspirin, and Dramamine. The patient improved slowly while in the hospital and 15 days after admission was sent home on Sept. 28, 1954.

Second Hospital Admission.—The patient was readmitted to the hospital about eight hours after she was discharged on Sept. 28, 1954. As she tried to get dinner ready for her husband, she became very lethargic and finally unmanageable—throwing herself about and not responding to questions.

In bed at the hospital she would lie quietly at first and hold her eyes closed. Then, she would jerk her arms and hands in various positions, breath against a closed glottis and her back would assume an opisthotonus-like position. These seizures lasted 30 seconds and recurred at frequent intervals. They were controlled only with large doses of barbiturates.

The blood pressure at this time was 100/60; pulse 100; respirations 24 and shallow. Lumbar puncture revealed a clear fluid. The opening pressure was 120 mm. of water and rose to 180 mm. when the patient moved suddenly. There were 4 cells per cubic millimeter (mononuclear). The colloidal gold curve was 1122100000. Blood examination disclosed hemoglobin 10.0 grams per cent; white cell count 9,450; hematocrit 34; sedimentation rate uncorrected 27, corrected 15. The urine was clear. Throat culture showed a heavy growth of hemolytic *Staphylococcus aureus.*

During the first two days of this hospital admission the patient continued to have repeated seizures and required restraints. These seizures were modified only by large doses of sedatives. In spite of the patient's pregnancy it was decided to give her fever therapy. She received three intravenous injections of killed typhoid organisms at two-day intervals. Her temperature rose to 104.8° F. (rectal), 104.2° F. (rectal), and 102.4° F. (rectal). When little immediate response to this form of therapy was noted, intramuscular chlorpromazine was begun. Two days later the seizures became less frequent. The patient became rational, and she was placed on oral chlorpromazine, 25 mg. every four hours.

She improved enough to be sent home on chlorpromazine therapy on Oct. 9, 1954.

Third Hospital Admission.—After her second discharge from the hospital the patient spent an uneventful evening at home with her husband. She slept well and awoke at 6:00 A.M. with headache, right flank pain, and nausea and vomiting. Her husband returned to the hospital to secure more chlorpromazine, and the patient fell asleep—so soundly that she could

not hear the telephone and responded only to frantic banging on the front door. Shortly after this she began to have convulsion-like seizures and was returned to the hospital on Oct. 11, 1954.

There were incoordinate movements of tongue and extremities. The blood pressure was 105/70; pulse 82 and regular; respirations 20; temperature normal. Urine culture showed a heavy growth of hemolytic *Staphylococcus aureus*, coagulase positive.

The dose of chlorpromazine was increased, and the convulsion-like seizures ceased. The consultant at this time believed there was a possibility that unprescribed medication might have been taken at home. This was never proved—the patient's hostility increased at this suggestion, however, and she signed her release from the hospital on Oct. 13, 1954. The tentative diagnosis was chorea gravidarum and conversion hysteria.

Fourth Hospital Admission.—After leaving the hospital the patient was followed prenatally at routine visits. Chlorpromazine medication was maintained for about six weeks and then discontinued. She was admitted to the hospital in active labor on Feb. 16, 1955, and after a labor of 17 hours delivered as male child who weighed 7 pounds, 15 ounces, and cried immediately and grossly appeared to be normal.

The patient's postpartum course was uneventful. She was discharged on the sixth postpartum day.

Postpartum Course.—Six weeks after delivery the patient's gynecological examination was essentially normal, although mild choreiform movements could still be discerned.

In September, 1955, the patient was seen again and showed no signs of choreiform movements. The baby appeared to be developing satisfactorily.

Comment

The case presented brings out several important factors, viz., the previous attacks of rheumatic fever and chorea; the successful therapy with chlorpromazine and the favorable outcome for both mother and baby.

Perhaps the most interesting factor is the psychogenic "color" in this case. Intensive questioning of the patient disclosed extreme emotional trauma from the conflict of religious faiths in intermarriage. Weigner[6] has emphasized that he believes choreiform behavior is an expression of psychic conflict—precipitated by social maladjustment or emotional turmoil. In analyzing the 950 cases reported by Willson and Preece he found in 137 cases evidence of psychogenic factors and the incidence of previous chorea, rheumatism, and cardiac disease definitely less great.

Summary

A case of chorea gravidarum is presented. The past and current literature has been discussed. Treatment was accomplished by bed rest, sedation, fever therapy, and chlorpromazine.

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IDENTICAL HYDROCEPHALIC ACHONDROPLASTIC TWINS; SUBSEQUENT DELIVERY OF SINGLE SIBLING WITH SAME ABNORMALITIES

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IDENTICAL achondroplastic twins are a medical rarity. Goodman[1] first reported a pair in 1945. A search of the literature of the intervening years has disclosed no further cases.

Hydrocephalus in association with achondroplasia has been described as common by MacCallum.[2] This opinion is in agreement with that of Koller.[3] More recent work has indicated that enlargement of the head, due to hypertrophy of the bones and often mistaken for hydrocephalus, is frequent, but that true hydrocephalus in achondroplasia is rare.[4, 5]

The case to be reported is one of identical achondroplastic twins with marked internal hydrocephalus, followed after several years by a single sibling presenting the same syndrome.

Case Report

The patient was a white woman of French descent. In 1950, at 25 years of age, she was delivered by low forceps, after an uncomplicated 12 hour labor, of a normal male infant who weighed 2,863 grams. The prenatal course was normal except for slight late hypertension. The infant did well, and has continued to be perfectly normal to the present.

In 1951, during the second pregnancy, there was again slight hypertension and some excess weight gain. At 36 weeks, premature rupture of the membranes occurred, followed by the onset of labor and the patient was admitted to Beth Israel Hospital. Labor was brief. A grossly hydrocephalic and achondroplastic female infant weighing 1,920 grams was delivered with low-mid Kielland forceps. The second twin, a female weighing 1,700 grams, was delivered by footling breech extraction and Piper forceps. Its appearance was identical with that of the first. The placenta was grossly a single one, and the septum between amniotic spaces consisted of two layers. Blood studies were identical: AB Rh rh, M, Hr positive. Infant A died in two hours and infant B in forty-eight hours.

Autopsy was performed on both babies by Dr. Howard Quittner, with identical findings. Pertinent portions of the protocol read as follows: "Outstanding findings are in the skeletal system. These are most prominently seen in the lower ends of the femurs and upper ends of the tibias whose epiphyses are markedly widened. The shafts of these bones are short and thick. Other long bones show similar changes. . . . The posterior fossa of the skull is flattened and thickened and the edges of the foramen magnum are thickened and rounded producing a free edge which presses on the spinal cord in this site. . . . The brain tissue bulges up through the incised dura. In removal, when the brain tissue is punctured, there is a rush of amber-colored fluid followed by a collapse of the brain cortex which forms a thin sac-like structure. . . . Extraction of the spinal cord

through the foramen magnum cannot be accomplished. The bony edges of the foramen magnum abut upon and compress the dura in this situation, so that there is neither epidural nor subdural space identifiable on dissection."

The pathological diagnosis on both twins was: (1) achondroplasia with deformities of (a) the long bones; (b) the base of the skull, producing compression of the subarachnoid and epidural spaces of the Arnold-Chiari type, with (2) internal hydrocephalus.

The patient's third pregnancy in 1952 was uncomplicated and she was delivered by assisted footling breech extraction, at term, of a normal male infant who weighed 3,629 grams. This child has done well since.

In 1954 the patient was again pregnant. The prenatal course was uneventful. Labor was rapid. A female infant weighing approximately 3,200 grams was found presenting by complete breech. Extraction was performed. There was difficulty with the aftercoming head. Vaginal examination then revealed hydrocephalus. Trocar aspiration of the skull obtained 400 c.c. of fluid and was followed by simple delivery of the aftercoming head.

Autopsy was performed with the following diagnoses: (1) internal hydrocephalus, (2) pulmonary atelectasis, and (3) advanced chondrodystrophy. The hydrocephalus was principally in the lateral ventricles and partially in the third ventricle. The fourth ventricle was small. The connection between the third and fourth ventricles could not be made out.

Comment

Survey of the family history of the mother and of the father in this case for the past three generations has disclosed no instance of achondroplasia. Most commonly, the parents of achondroplastic dwarfs are normal. The birth of an affected child to a couple both of whom are achondroplastic dwarfs is a rarity.[6] The condition appears to be inherited as a Mendelian dominant, but the process is complicated by frequent mutations and the "skipping phenomenon."[6]

Some authors have stated that hydrocephalus is a common accompaniment to achondroplastic dwarfism. MacCallum[2] ascribed the hydrocephalus to premature synostosis of the portions of the sphenoid with one another and with the base of the occiput. On the other hand, Draps[4] stated that the association is extremely rare, the achondroplasia presenting simply an increase in volume of the cranial vault by exaggeration of the development of the periosteal bones. Potter[5] noted that in her series of 8 cases, the heads have been uniformly enlarged but not hydrocephalic. The enlargement may be mistaken for hydrocephalus "but the amount of fluid in the head almost never increases." She stated that an increased anteroposterior diameter of the anterior cranial fossa produces much of the apparent increase in size.

When hydrocephalus does occur with chondrodystrophy, it has been ascribed to interference with proper circulation of the cerebrospinal fluid, caused by hypertrophy of the bones. In the twins herein reported, marked bony changes were found in the region of the foramen magnum, producing complete obliteration of epidural and subdural space, and apparently causing the hydrocephalus present. In Potter's experience, though the lumen of the foramen magnum is often considerably reduced, "this has not led to hydrocephalus before birth," but it is stated that osseous hypertrophy at the foramen magnum may cause sufficient compression of the cord to account for neo-

natal death. It is of interest to note that the hydrocephalus in the last child was not due to proliferation of bone at the foramen since the block was between the third and fourth ventricles. The autopsy report in this case makes no particular note of hypertrophy of the base of the skull to explain the blockage at the site indicated.

Summary

1. The second reported case of identical achondroplastic twins is presented.

2. The same parents subsequently produced a single achondroplastic child, with the birth of a normal sibling intervening.

3. All three achondroplastic dwarfs herein reported presented marked internal hydrocephalus.

4. The frequency of the association between achondroplasia and hydrocephalus is discussed.

Addendum.—Following the preparation of this article, the patient was delivered of a normal full-term baby.

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STILLBIRTH ASSOCIATED WITH PSEUDOMONAS SEPTICEMIA

Report of Two Cases

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THE causes of intrauterine or neonatal deaths are usually listed as complications in pregnancy or labor leading to fetal anoxia and/or prematurity—toxemia, diabetes, syphilis, and occasional maternal infections such as pneumonia, influenza, typhoid fever, and smallpox.[1, 2, 3] A review of the literature showed only 4 cases in which a Pseudomonas infection in the mother apparently produced either stillbirth or neonatal death. Kraus and Hunter[4] found only one case in their review of the literature up to 1941. They described this case that occurred in 1928[5] together with a case of their own in which a full-term infant with Pseudomonas septicemia was delivered but lived only 20 hours. The mother had developed Pseudomonas enteritis on the day before delivery. In 1948 Sobhi[6] reported a case of a 28-year-old woman who, the author believed, aborted during the third month of her pregnancy. Two days prior to the abortion she developed a fever. After the passage of blood clots her fever increased and *Pseudomonas aeruginosa* was cultured from her blood and urine. Despite antibiotic therapy the woman died 33 days after the abortion. A necropsy revealed *Pseudomonas aeruginosa* and *Escherichia coli* in the pericardial fluid and on the cut surface of the lungs. Since Sobhi's report there has been one other case recorded. In 1949 Hills[7] reviewed the literature and described the case of a primipara who developed the signs of pre-eclamptic toxemia in the seventh month. Labor was artificially induced and after five days she delivered twins, a stillborn female and a male infant that died 24 hours later. The patient later developed a Pseudomonas septicemia and died with acute bacterial endocarditis. The author believed that this represented a puerperal infection arising from either the urinary tract or the endometrium.

The purpose of this paper is to report two new cases, one of which more conclusively demonstrated the ability of *Pseudomonas aeruginosa* to cause stillbirth.

Case Reports

CASE 1.—On Sept. 12, 1952, a 38-year-old white gravida iii, para ii, who was a private patient of Dr. Daniel O. Hammond, was admitted to Jackson Memorial Hospital with a history of chills and fever for the past 24 hours. Her last menstrual period was June 12, 1952, but she had been spotting periodically since that time. Upon admission her temperature was 103° F.; her blood count and urinalysis were essentially normal. A blood culture taken on admission was reported six days later positive for *Pseudomonas aeruginosa*. Thirty

hours after admission she passed, spontaneously, a 3 inch fetus with part of the placenta. She was given 400,000 units of penicillin and 0.5 Gm. of streptomycin upon admission. This medication was repeated every 12 hours for four days. The temperature was elevated to 103° and 104° F. for the first 12 hours, but it dropped to normal on the day after admission and remained so until the patient was discharged four days later.

Pathologist's Report.—The specimen submitted included a 9 cm. fetus and decidual tissue. Microscopic examination showed the presence of a moderate number of neutrophils but no bacteria.

CASE 2.—A 22-year-old woman, gravida v, para iv, entered Jackson Memorial Hospital at 6:30 A.M. on July 17, 1955. The expected date of confinement was Aug. 17, 1955. Her antepartum course had been uneventful until about nine and one-half hours prior to admission when she developed a mild backache. Four and one-half hours before admission she became nauseated and began to vomit. Two hours before admission she began to have labor pains, chills, and fever. Upon admission the patient had a temperature of 101° F. pulse 140, respirations 24, and blood pressure 114/70. Her skin was warm, dry, and no rash was noted. Soon after admission she had a loose, foul-smelling stool, the only abnormal stool during her illness. Physical examination showed no abnormalities except for the abdomen which revealed a gravid uterus of about 36 weeks' gestation and an absence of fetal heart sounds. The patient stated that she had not felt the baby move since the onset of her present acute illness nine hours previously. Rectal examination disclosed a cephalic presentation with the cervix dilated 2 cm., 80 per cent effaced, and the presenting part at station minus one. A complete blood count, blood culture, and blood chemistry determinations were obtained immediately upon admission. She was then given an intramuscular injection of 400,000 units of penicillin and 1 Gm. of streptomycin. This was repeated every 12 hours.

The laboratory findings were: urinalysis negative, hemoglobin 9.9 Gm., red blood count 3.05 million, white blood count 5,200 with stab cells 49, segmented cells 27, lymphocytes 21, and eosinophils 2. The platelets appeared normal. No ova or parasites were seen in the stool examination but there were numerous red blood cells. The serum sodium was 136 meq. per liter, serum potassium was 3.25 meq. per liter, plasma chlorides 109 meq., serum carbon dioxide was 14.2 meq. per liter, nonprotein nitrogen was 19 mg. per cent. At 9:00 A.M., two and one-half hours after admission, the cervix was completely dilated and at 9:20 A.M. there was delivered spontaneously a stillborn male infant that weighed 2,570 grams. The placenta was delivered 20 minutes later, intact, and was not grossly abnormal. The patient was then transferred to the recovery room where her immediate postpartum course was uneventful, the blood pressure remaining around 120/70. Her temperature was normal throughout the day of delivery and her condition was good until about 11:00 P.M., 14 hours post partum, at which time she was seen because of a marked pallor of the skin, subnormal skin temperature, and a sudden drop in blood pressure. She had had no further loose stools or vomiting since admission. Upon examination the blood pressure was 50 systolic, 0 diastolic, and the pulse 120; the heart and lungs were normal. The reflexes were normal and no nuchal rigidity was elicited. The abdomen was soft and not abnormally tender. The uterus was well contracted, the lochia was normal in amount, color, and odor. The liver was palpable one fingerbreadth below the costal margin. The exact cause for this sudden drop in the patient's blood pressure could not be explained but it was thought advisable to give her 500 c.c. of whole blood and ⅜ grain of ephedrine sulfate. Following this therapy her blood pressure and general condition returned to normal during the night and the following day she felt very well. On the first postpartum day the blood chemistry determinations and the complete blood count were repeated and were normal except for 17,000 white blood cells with 6 per cent eosinophils. A total circulating eosinophil count on the second postpartum day was 356.25 per cubic millimeter. The febrile agglutinations taken on the day of admission were negative, but cultures of the patient's

stool and blood taken on the same day were reported positive for *Pseudomonas aeruginosa.* She improved each day, her blood pressure, temperature, and pulse remained normal, and she was discharged symptom free on the tenth postpartum day.

Pathologist's Report.—The autopsy was begun nine and one-half hours after birth. The body was that of a well-developed male infant weighing 2,570 grams and measuring 48 cm. from crown to heel. There were slight superficial maceration and diffuse purplish mottling of the skin. The umbilical stump was not remarkable. The abdomen contained 20 c.c. of a cloudy brown fluid while the right and left pleural spaces contained 15 and 5 c.c. respectively. The heart weighed 10 grams and appeared normal. A patent ductus arteriosus was present. The trachea and bronchi contained a small amount of reddish brown fluid. The right lung weighed 32 grams, and the left 24 grams. There was a thin, loosely adherent fibrinous exudate over the surface of both lower lobes. On section, the parenchyma was firm and beefy red throughout. The remaining organs were congested but otherwise grossly normal.

Microscopic examination showed the following:

Lungs: There were congestion, atelectasis, edema, and focal intra-alveolar hemorrhage. A few neutrophils and several foci of necrosis were scattered about the parenchyma. Special stains failed to show any bacteria. Of interest were a number of greatly dilated lymph channels which contained strands of fibrin and many neutrophils.

Heart: The myocardium was not remarkable, while the epicardium appeared edematous and focally infiltrated with lymphocytes.

Gastrointestinal tract: The intestines were congested and portions of the serosal surface were covered by an eosinophil-containing fibrinous exudate.

Liver: The sinusoids were engorged with blood. A normal degree of extramedullary hematopoiesis was present.

Spleen: There was moderate congestion of the red pulp. Special stains failed to reveal bacteria.

Thymus: Except for moderate congestion and slight medullary neutrophilic infiltration, the gland was normal.

Genitourinary tract: The kidneys were congested, but otherwise normal. There were two small, ill-defined areas of necrosis within the bladder wall.

Adrenal glands: Both glands were moderately congested and contained some areas of hemorrhage. The medulla and deeper cortical zones were moderately autolyzed.

Brain: The brain sections showed diffuse congestion.

Bone marrow: The section of marrow had a normal active appearance.

Specimens of blood, lung, and spleen all produced a pure growth of *Pseudomonas aeruginosa* which, like that from the mother's stool and blood, were heavily pigmented and did not ferment dextrose. The placenta was not cultured but gram-negative bacilli were seen in sections made from the tissue which had been placed in fixative approximately two hours after delivery.

Comment

It is probable that each of the women described had *Pseudomonas aeruginosa* septicemia. The source of this infection in the first case is not known, while it may have stemmed from enteritis in the second. In the first instance this septicemia resulted in abortion during the third month and in the second the term infant was born dead.

It is difficult to estimate accurately the duration of intrauterine death at autopsy. Using Potter's[8] criteria, it is felt that in the second case the infant had been dead for no more than 36 hours prior to delivery.

Three pure cultures and histologic evidence of inflammation in the lungs, urinary bladder, and serosal surface of the intestines strongly suggest that the infant also had septicemia.

Organisms from the maternal blood stream entering the fetus by way of the umbilical vein are filtered through the liver and usually set up a severe reaction there. This series of events is not present in our case; indeed, the picture resembles the widespread pneumonia seen following aspiration of contaminated amniotic fluid.

Summary

The literature concerning abortion, stillbirth, and neonatal death associated with *Pseudomonas aeruginosa* has been reviewed briefly and two new cases reported. A short description of the autopsy findings in one of these was given.

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CARCINOMA OF THE CERVIX IN AN INFANT*

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THE case history to be presented is that of an 11-month-old girl who had an adenocarcinoma of the cervix. It is thought to be the fifth recorded case of cervical carcinoma occurring in a child under 1 year of age.

Surveying the literature for this disease in this age group is extremely simple as there are few writings pertinent. The first case to be reported was by Bumm[1] from Germany in 1910. This was a 7-month-old girl who, when examined because of vaginal bleeding, was found to have a "rankly growing mass in the vagina extending from the posterior lip of the cervix." This proved to be an adenocarcinoma of the cervix and was treated by total hysterectomy. The child died a few weeks later of pyelitis, and at autopsy a small nodule of residual tumor was found in the rectovaginal septum.

The second case was reported by Edward J. Waters[4] in 1940. This patient was a 7-month-old baby whose first symptom was bleeding per vaginam. The child had developed normally up to the time of the onset of bleeding. A palpable pea-sized growth was seen on the anterior lip of the cervix, a biopsy of which showed an adenocarcinoma. To avoid the potential effects of radiation on the ovaries, the left uteroovarian ligament was divided and the left ovary freed with its mesoovarium. This permitted the ovary with its pedicle of the infundibulopelvic ligament to be carried laterally and upward where it was attached to the peritoneal aspect of the anterolateral abdominal wall. Following this, the baby received by teleradium 15,000 mc. hr., during which time the ovary was protected by lead screens. The baby did well initially but the disease recurred both locally and as metastases in distant areas. The baby died of carcinoma at the age of 1 year, 10 months. An autopsy showed adenocarcinoma of the cervix with extension to the parametrium, bladder, and rectum, and metastases to the lymph nodes, lungs, and liver.

Two more cases were reported by Heckel[8] in 1950. The first of these was a 7-month-old girl who was seen because of vaginal bleeding present for one month. When seen, the child was moribund and she died a few hours after admission to hospital. At autopsy, a large friable tumor filled the vagina and extended along the cervical canal into the uterus and both tubes, and had involved the ovaries. The microscopic diagnosis was adenocarcinoma of the cervix. The second patient was seen four days after the onset of vaginal

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bleeding at 11 months of age. On examination, there was a friable redundant mass in the vagina extending from the cervix. A biopsy showed it to be an adenocarcinoma. A total hysterectomy was done, with preservation of both ovaries. Personal communication with Dr. Heckel showed that this child is alive and well 6½ years after operation.

Case Report

The child was born on Feb. 21, 1953, and was admitted to hospital on Jan. 24, 1954, at 11 months of age. There was a history of vaginal bleeding since Jan. 4, 1954. The pregnancy and delivery had not been remarkable and the child had developed normally up to the onset of bleeding. This was first noted as a plum-colored stain on her diapers and persisted as a slight trickle of bloody fluid up to the time of admission. Examination showed a well-developed 11-month-old child with no obvious disease. On rectoabdominal examination there was a mass in the pelvis about 5 cm. in diameter which was thought to be fixed in the midline. Vaginal examination showed friable tissue in the vagina which bled readily. Smears were taken for cytology which were positive, showing scattered clumps of bizarre cells consistent with malignancy. Other laboratory tests showed a hemoglobin of 94 per cent and a white cell count of 13,000.

On Jan. 28, 1954, the baby was examined under anesthesia per vaginam. A large friable tumor was found extending from the posterior lip of the cervix. A biopsy was taken at this time. At bimanual examination there appeared to be extension laterally on either side to the pelvic walls. A laparotomy was done at this time. The lateral extension of the tumor was confirmed and in addition the tumor was found to extend posteriorly into the uterosacral ligaments. It was, therefore, considered inoperable. The body of the uterus, the tubes, and ovaries appeared grossly uninvolved.

Biopsy showed an infiltrating, poorly differentiated adenocarcinoma. There was in some areas a tendency to form papillary structures. Mitoses were numerous and marked nuclear pleomorphism was present. No mesodermal elements were seen that would suggest a tumor of the botryoid type. The diagnosis was adenocarcinoma of the cervix.

Postoperatively the child developed a wound infection followed by an upper respiratory tract infection so that external radiation was not begun until Feb. 25, 1954. Over the next 41 days the child received a tumor dose of 3,900 r through an anterior field only, given by means of the cobalt bomb at the British Columbia Cancer Institute. The baby tolerated this treatment well, maintaining weight and satisfactory blood levels. During the treatment period the tumor regressed to approximately one-third of its previous size and the bleeding subsided. A cystoscopy and pyelography were done on April 10 which showed no abnormal findings. The child was discharged from the hospital at this time.

She was seen at monthly intervals for the next four months, during which time the tumor slowly increased in size. The child's general health was good but she began to bleed again per vaginam in June, 1954, and this slowly increased in amount until August, 1954. The bloody vaginal discharge was foul smelling and bowel movements were difficult and painful. At the end of August, the bleeding became profuse and the child was admitted for a re-evaluation. Examination under anesthesia was done on Sept. 1, 1954. A firm, rubbery, globular mass about 6 cm. in diameter was palpated which almost filled the pelvis and seemed fixed to the sacral promontory. On vaginal examination, the upper vagina was filled with grayish necrotic material, apparently attached to the cervix. A biopsy was taken and microscopic examination showed adenocarcinoma. Again, no evidence of mesodermal structures could be seen. Palliative radiation was undertaken for the purposes of restraining the growth and controlling bleeding. A tumor dose of 2,365 r was given in a period of 41 days with the 400 kv. x-ray machine. Examination following this treatment showed the tumor to be slightly smaller and the bleeding had subsided. An x-ray of the chest taken on Oct. 15, 1954, showed a metastatic lesion about 3 cm. in diameter in the hilus of the left lung. The child was discharged from the hospital on Oct. 20, 1954.

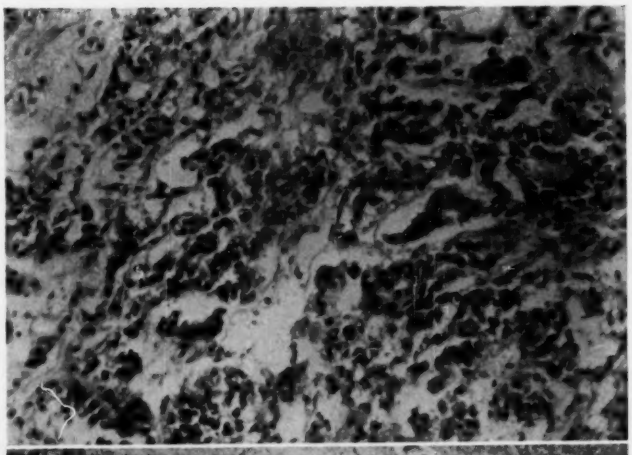

Fig. 1.

Fig. 2.

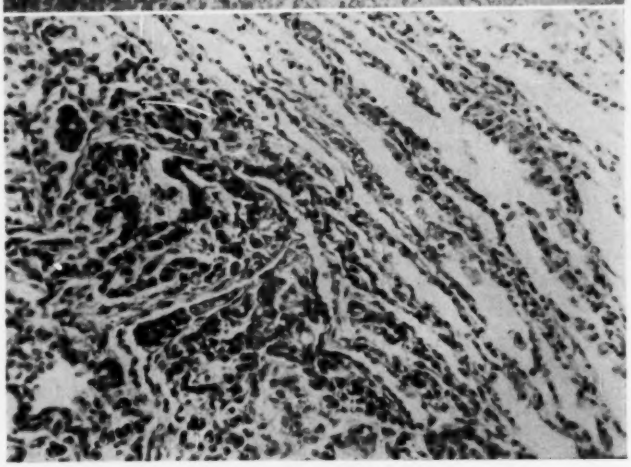

Fig. 3.

Fig. 1.—A high-power photomicrograph of the cervical tumor. The adenomatous pattern and nuclear pleomorphism are evident. (Hematoxylin and eosin, ×90; reduced ⅓.)

Fig. 2.—Low-power view of a liver metastasis. The tumor can be seen at left. It again shows a suggestion of adenomatous structure. It is separated from normal liver by dense fibrous connective tissue. (Hematoxylin and eosin, ×90; reduced ⅓.)

Fig. 3.—High-power view of lung metastasis. Normal lung is to the right. The tumor tissue is quite anaplastic but again a suggestion of gland formation is discernible. (Hematoxylin and eosin, ×90; reduced ⅓.)

At home she remained well, happy, and free from pain until about the end of November when she began to develop symptoms of obstruction of the bowel and difficulty with micturition. She gradually developed bilateral pleural effusions which were associated with dyspnea and orthopnea. She died on Dec. 30, 1954, apparently in marked respiratory distress. The child was 22 months of age at time of death, having survived 11 months after the diagnosis of adenocarcinoma of the cervix was made.

At autopsy, a large right and a lesser left pleural effusion were found to account for her respiratory difficulties. There were many large metastases in the lungs as well as in the liver. The tumor had not extended through the peritoneum within the abdomen, but the rectum and bladder walls were grossly involved. Microscopic examination showed a rather undifferentiated adenocarcinoma in the primary lesion (Fig. 1) and a similar picture in all the metastases (Figs. 2 and 3). Sections through the lung in uninvolved areas showed a low-grade inflammation and some intra-alveolar hemorrhage.

A survey of published reviews and case reports[1-8] disclosed 19 reported cases of carcinoma of the cervix in patients 15 years or under. In all of these the diagnosis was adenocarcinoma. Three other cases were considered but were excluded on the following grounds: one case was thought to have been reported twice[1, 2]; one case initially diagnosed as adenocarcinoma subsequently showed teratomatous elements; the third case changed from an adenocarcinoma to an endothelioma over the course of several examinations.[5]

Summary

1. The literature pertaining to carcinoma of the cervix occurring in infants under 1 year of age is reviewed.

2. To date it is believed that only 5 cases have been reported.

3. The case history of an 11-month-old infant who had an adenocarcinoma of the cervix is presented.

4. Carcinoma of the cervix in children under 15 years of age has, in all recorded cases, been adenocarcinoma in type.

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OVARIAN LYMPHOSARCOMA

Report of a Case With Review of the Literature

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LYMPHOSARCOMA involving the ovaries is extremely rare. In a review of the world literature two primary[3, 4] and three secondary lymphosarcomas[1, 2, 5] of the ovaries have been reported. In a review of the reported cases, the following pertinent facts were obtained.

Two patients with primary lymphosarcoma of the ovaries were parous women. One died five months after an exploratory laparotomy and the other soon after a spontaneous delivery. Autopsies revealed lymphosarcoma of intraperitoneal and extraperitoneal organs. The 3 patients with secondary lymphosarcoma of the ovaries were a 2-year-old child and 2 parous women. Two died shortly after exploratory laparotomies and the third seven days post partum. Autopsies disclosed lymphosarcoma of intraperitoneal and extraperitoneal organs.

M. G., a 36-year-old white housewife, was admitted to the St. Agnes Hospital, Philadelphia, on Oct. 20, 1951, with a diagnosis of uterine fibroids.

A total hysterectomy and bilateral salpingo-oophorectomy were done. The uterus and the Fallopian tubes were normal. The right ovary measured 15 cm. in diameter and on gross inspection presented the appearance of mucoid degeneration. The left ovary was 12 cm. in diameter and was similar in appearance. The histological features were mucoid degeneration and sarcomatous infiltration (Fig. 1).

Her convalescence was uneventful and she was discharged on the twelfth postoperative day. She continued in good health for approximately 6 months, when she began to complain of pain in the left upper quadrant associated with food intake. She was then admitted to the Graduate Hospital, University of Pennsylvania, on April 14, 1952.

X-ray studies of the gastrointestinal tract showed smooth filling defects in the third portion of the duodenum and proximal jejunum associated with marked distortion of the mucosal pattern. The lesions were nonobstructing. Due to the multiplicity of the lesions and the character of the defects, a roentgen diagnosis of malignancy was made, most likely lymphosarcoma.

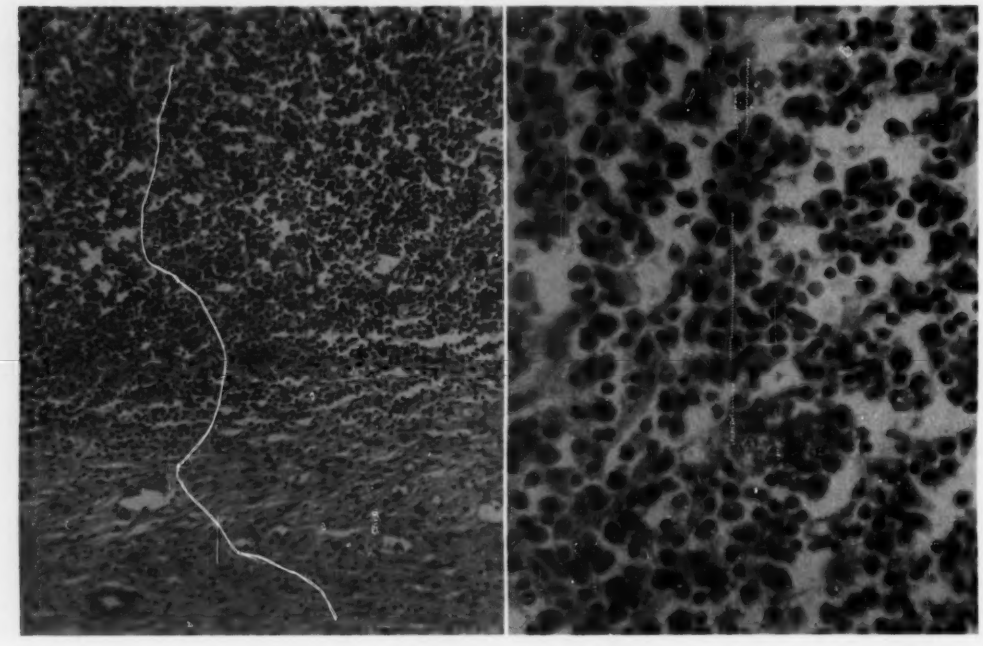
Blood studies showed a mild secondary anemia but were otherwise negative.

Bone marrow biopsy consisted of a normal marrow, except for the presence of an increased number of mature plasma cells, which were present singly and in clumps. There was no evidence of lymphosarcoma involving the marrow and no masses of malignant cells were seen. Several strands of reticuloendothelial cells were seen but there was no definite malignancy.

Laparotomy on April 16, 1952, revealed huge, firm masses involving the wall of the proximal jejunum at the ligament of Treitz, another mass about 14 inches distally, and a

third smaller mass in the proximal ileum. The masses encircled the bowel, but did not completely obstruct the lumen. In the proximal jejunum the lesion extended through the serosa but was not attached to any of the surrounding structures. The regional mesentery contained large firm nodes extending down to the root and periaortic lymph nodes. The lesions were considered nonresectable, but due to impending obstruction a jejunoduodenostomy was done. Then the lesion in the ileum was resected along with a wedge of mesentery and a primary end-to-end ileal anastomosis was done.

Microscopic Description.—Sections of the bowel consisted of a very compact structure. It was made up of lymphocytes; the infiltration extended from the surface of the mucosa through the entire wall including the serosal side. This was undoubtedly a lymphocytic type of lymphosarcoma.



A. *B.*

Fig. 1.—*A*, Low power. Section of ovary demonstrating line of demarcation between edematous ovarian stroma and lymphosarcomatous infiltration.

B, High power. Section of lymphosarcoma of ovary showing round-cell infiltration with little surrounding stroma.

Postoperative Course.—The postoperative convalescence was uneventful. On the seventh postoperative day, x-ray therapy was started, consisting of a total of 2,000 r (air) which was administered to each of four 12 by 16 cm. upper abdominal ports, two anterior and two posterior.

On completion of the x-ray therapy, a physical examination showed no abdominal masses, but moderate-sized axillary and cervical nodes were present.

The patient was given nitrogen mustard therapy on 3 successive days. Four milligrams was administered for two successive days, and 8 mg. was given on the third day. A bone marrow biopsy was then repeated, showing an increase in the number of plasma cells, but no tumor cells were found.

The patient developed progressive loss of appetite, weakness, and cachexia. The pains in the abdomen progressively increased and she was unable to retain solid foods. Vomiting became more frequent and profuse. The patient died at home nine months after the removal of the lymphosarcoma of the ovaries and two months after the jejunoduodenostomy.

Comment

From the hematological standpoint there are several aspects of this case worth noting. The pathological diagnosis of lymphosarcoma from one site and the suggestion that in another site the lesion is compatible with reticulum-cell sarcoma is not unusual. Many extensive surveys, notably that by Custer,[6] have shown that neoplasms of the lymphocytic and reticuloendothelial systems frequently present different histological pictures in different loci or at different times in the same locus. Probably this simply expresses the fact that the cell of origin of these lesions is multipotential and may differentiate in varying directions.

The number of cases of lymphosarcoma involving the ovary is small considering the great frequency of lymphosarcoma in the other sites. Several of the reports in the literature refer to the ovarian involvement as being "primary" or "secondary." In view of the generally accepted fact that leukemia and lymphomas are multicentric, this terminology is misleading. It implies that the nature of the disease process involves a primary lesion and metastases. Much is unknown concerning the malignancy and future knowledge will probably require changes in terminology, but at present it seems best to consider lymphosarcoma occurring in multiple sites as having arisen from cells native to those sites rather than as having metastasized from a primary source. For this reason "primary" and "secondary" are terms best discarded.

From the gynecological standpoint there are several aspects worth noting: The finding of indiscrete masses located in the upper midabdomen along with ovarian masses may perhaps be suggestive of abdominal lymphosarcoma. One has the impression that by the time the lymphosarcoma involves the ovaries it is already an advanced malignancy. No patient lived more than five months after the onset of symptoms.

The size of the large ovarian tumors found in lymphosarcoma is impressive. Two were unilateral in the left ovary and 3 were bilateral. The lymphosarcoma was widespread in the 2 patients in whom the lesion was thought to be primary in the ovaries. In the remaining 3 patients in whom the lesions were thought to be secondary, they were present only in the stomach in one; in the stomach and duodenum in the second; and in the third patient in the jejunum and mesenteric lymph nodes.

Our patient had an early lymphosarcoma as compared with the cases reported in the literature. She was asymptomatic when first seen. The absence of symptoms and the well-being of the patient for six months were thought to be due to the complete removal of the lesion, but the reappearance of masses in the abdominal cavity accompanied by acute gastrointestinal symptoms suggested the probability of sarcoma in the gastrointestinal tract. Resection of the jejunum and mesenteric lymph nodes established the diagnosis of lymphosarcoma, which was probably present and was silent at the time of the hysterectomy.

Summary

1. Two "primary" and 3 "secondary" lymphosarcomas of the ovaries have been reported in the world literature.

2. The terms "primary" and "secondary" lymphosarcoma of the ovaries are misleading in view of the generally accepted belief that lymphosarcoma and leukemias are multicentric in origin.

3. It is a highly malignant disease, the mortality having been 100 per cent within five months from the day of onset of symptoms in the recorded cases.

4. There is no known method of diagnosing ovarian lymphosarcoma except by laparotomy. The finding on palpation of indiscrete intestinal masses in the upper and midabdomen along with ovarian masses may perhaps suggest the presence of lymphosarcoma.

5. The ovarian tumors in the 5 reported cases were unusually large in contrast to the smaller gastrointestinal lesions.

6. The treatment of ovarian lymphosarcoma should be based on multicentricity of origin rather than unicentricity of origin.

7. Two of the patients harbored unrecognized lymphosarcoma of the ovary during pregnancy.

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BILATERAL ENDOMETRIOSIS OF THE VULVA*

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(From St. Catherine's Hospital, Brooklyn, N. Y.)

ENDOMETRIOSIS in the vulva is rare, though its occurrence in other skin sites has often been described. Cullen[1] in 1896 and von Recklinghausen[9] in 1898 described cases of "adenomyomata" of the labia majora. Despite these early descriptions of the lesion, only fourteen cases have been previously reported. The first twelve of these were described by Rothman,[8] the thirteenth by Olivier and Blondeau.[6] The fourteenth was added by Duson and Zelenik.[2] Our own case, the fifteenth, is unique in that it developed twice in the same patient in different scars of the vulva.

Case Report

E. M., a 27-year-old white nulligravida, was first seen on March 25, 1954, because of sterility of five years' duration. Intercourse was impossible because of superficial pain. For two years she had noted two small "cysts" on the right side of the vulva, which enlarged at the time of menstruation. These caused a constant burning sensation which became more severe at the time of the periods.

Because of pain and spasm vaginal examination could not be made. A scar was noted on the right side of the vulva, the site of removal of a cyst of the Bartholin gland in 1948. In two areas, 2.5 cm. apart, there were puckering and slight induration of the scar, dark blue in color. Each was less than 1 cm. in diameter, tender, irregularly round, firm, and fixed to the skin. On the left a small, nontender swelling was also noted in the area of the Bartholin gland. Rectal examination disclosed no pelvic abnormality. The patient was seen again on March 31, 1954, at the onset of the menstrual flow, complaining of vulvar pain. The right side of the vulva was swollen, tense, and tender. The two previous distinct areas were confluent. The right-sided mass now occupied 4 to 5 cm. of the right labium majus and minus, but the one on the left was unchanged. She was admitted to St. Catherine's Hospital for biopsy on April 6, 1954.

There had been two previous admissions. In 1946 a large cyst had been removed from the left vaginal wall, left labium majus and minus, which extended from within 1 inch of the symphysis to the perineum. The diagnosis made at that time was that of a vaginal cyst of unspecified character, and little structure could be seen on review of the slides. In 1948 a Bartholin cyst 3 cm. in diameter was removed from the right side. Both the physical examination and the admission note of 1948 referred to two puckered, dark blue areas in the scar of the left side. This scar was removed but, unfortunately, the tissue did not receive microscopic examination. The 1948 diagnosis, however, was vulvar endometriosis, left, Bartholin cyst, right. No curettage was done at either operation. No menstrual period occurred while the wound was healing.

On April 8, 1954, a bilateral wedge resection of the vulva was carried out under general anesthesia. The postoperative course was uncomplicated and the wound healed by primary intention.

Pathologic Examination.—The specimen consisted of a portion of skin and subcutaneous tissue from the right labium majus, measuring 3 by 3 by 2 cm. A firm nodule was present

*Presented at a meeting of the Brooklyn Gynecological Society, May 18, 1955.

beneath the skin which, on section, proved to measure 1.3 cm. in diameter. It exhibited numerous tiny reddish-brown areas and did not appear to be encapsulated. Microscopic examination showed tissue resembling islands and stroma of endometrium (Fig. 1).

The specimen from the left labium measured 3 by 2.5 by 2 cm. It contained a subcutaneous nodule measuring 1.4 cm. in diameter, which did not appear to be encapsulated. Microscopic examination showed a Bartholin gland with a small cyst and chronic inflammation.

Postoperative Course.—The patient was next seen on May 17, 1954. The operative wounds were well healed. Since this patient had originally complained of sterility, she was examined for signs of pelvic endometriosis but no evidence of disease could be found.

On Sept. 16, 1954, she reported for her first prenatal visit, having had her last menstrual period on June 12, 1954. She was delivered from left occipitotransverse position, with Barton forceps and a right mediolateral episiotomy, of an apparently normal living male infant that weighed 8 pounds, 2 ounces, on April 1, 1955, after an eight-hour labor. The vulva was pliable and gave readily before the oncoming head. Her postpartum course was uneventful and she was discharged from the hospital on April 8, 1955, in good condition.

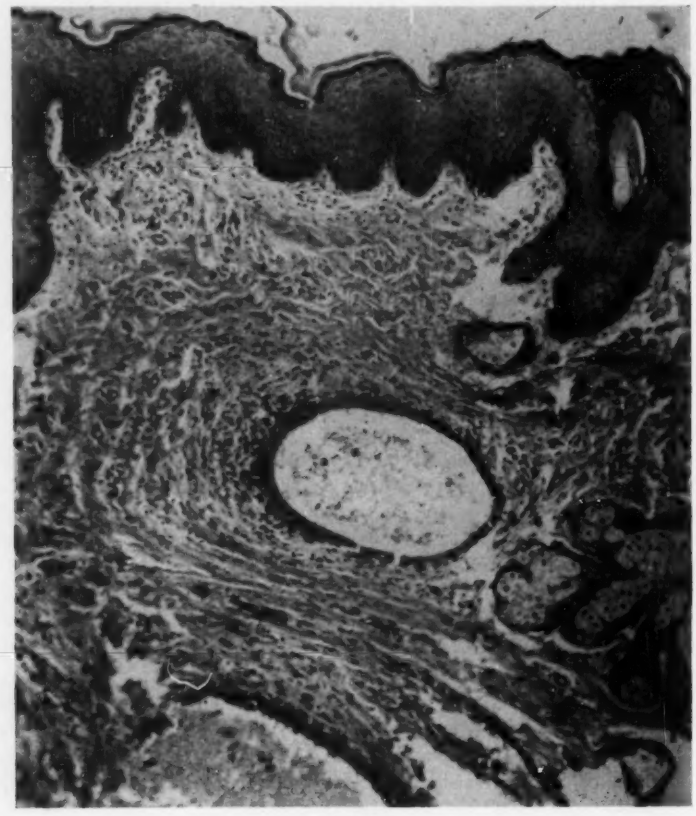

Fig. 1.

Comment

Endometriosis of the vulva may pass unrecognized if the ectopic endometrial tissue does not undergo functional changes. The absence of such function may account for the delay in appearance of symptoms, if these lesions result from implantation at the time of operation or during wound healing. In our case,

the patient had been discharged from the hospital for two weeks and the wound had healed before the onset of her menses (1948). In view of this fact, one wonders if viable endometrial cells are present in vaginal discharges at times other than menstrual.

Rothman believed that implantation was the cause in his case. Trauma, either obstetric or operative, has certainly preceded the development of vulvar endometriosis in most instances in medical records. Apparently the type of wound healing is not a factor, since in the first instance our patient's wound healed by primary union and two years later showed clinically diagnosed endometriosis, while after the 1948 operation, the wound of which healed by granulation, she developed symptoms of endometriosis at a much later date. The question must also be asked, why, if implantation is the cause, we do not see it in the childbearing years after perineal repair both obstetric and plastic, which so often are preceded by dilatation and curettage.

If, on the other hand, Javert is correct in reviving the theory of benign metastasis, why in our case was no disease set up in the inguinal nodes? Javert's work showed lymph gland involvement principally in the cases with pelvic endometriosis. Our patient has shown neither sign nor symptom of such a mode of spread.

If spread by venous channels is to be possible, then a patent foramen ovale or lung involvement must also be postulated to produce distant endometriosis. There is only one instance of lung involvement in medical literature and that was experimentally produced in rabbits. Lung involvement in the human has yet to be described.

The celomic metaplasia theory, which is almost impossible to prove or disprove, contends that cells from the primitive celom of the embryo exist in the sites in which endometriosis develops and are capable of change into endometrial tissue. In our case, if primitive cells were present bilaterally, why did they not develop at the same time?

It is interesting also that our patient became pregnant so quickly after her dyspareunia was corrected. This is an argument against the presence of pelvic endometriosis of any significant degree.

Summary

We have added the fifteenth case of endometriosis of the vulva to the medical record. Our case was unique, however, in that it was bilateral.

Gratitude is extended to Dr. Francis Hogan for his assistance in the preparation of this report.

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POSITIVE VAGINAL CYTOLOGY IN PRIMARY CARCINOMA OF THE FALLOPIAN TUBES

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THE difficulties that surround early diagnosis of tubal carcinoma are generally recognized; therefore, any new method of approach to the problem is of importance.

In 1950 Hill[1] wrote, "Of undetermined value in the diagnosis of carcinoma of the fallopian tube is the use of the Papanicolaou stain from the vaginal tract. There have been no reports of the use of this stain, either in the diagnosis or as an aid in the diagnosis."

Since then Fidler and Lock[2] have demonstrated the value of the cervical smear as an aid in the diagnosis of carcinoma of the Fallopian tubes. They reported five cases. Four of these had Papanicolaou smears, three of which were positive for carcinoma cells suggesting adenocarcinoma.

In 1955, Song[3] reported a case in which cells of adenocarcinoma were identified in the vaginal smear taken at the time of postmortem examination on a patient who died of carcinoma of the Fallopian tubes.

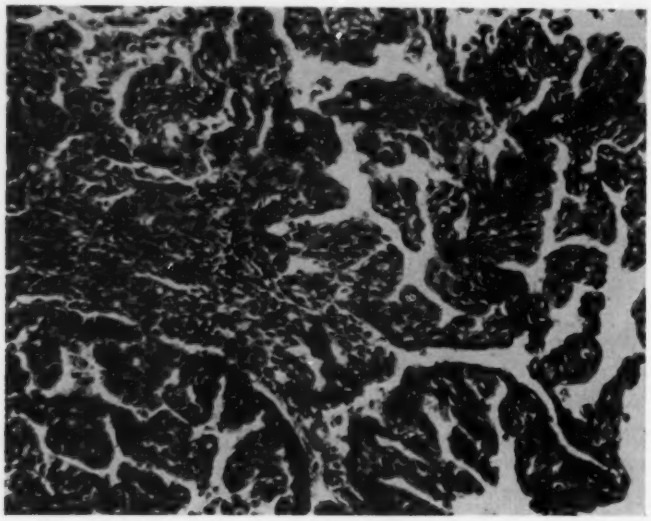

Fig. 1.—Papillary tumor as it arises from the wall of the Fallopian tube.

The following is a report of a 51-year-old woman, gravida 0, who sought help in January, 1955, because of an intermittent serosanguineous vaginal discharge of one year's duration, commencing about a year after the menopause.

On pelvic examination, the cervix was found to be smooth with no bleeding or discharge. The uterus was retroverted and of average size. The adnexa were palpated with difficulty. There seemed to be some fullness but no definite masses were outlined.

Fig. 2.

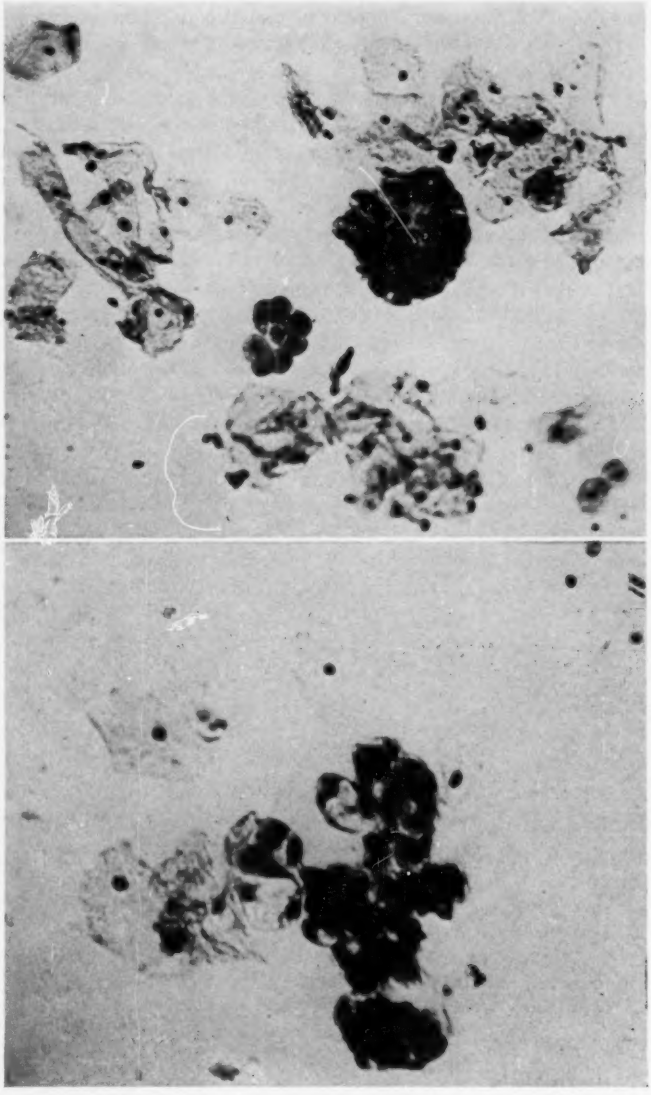

Fig. 3.

Fig. 2.—Photomicrograph of one of the Papanicolaon smears, showing a number of obviously benign epithelial cells. Note especially the one group of hyperchromatic tumor cells.

Fig. 3.—Photomicrograph from Papanicolan smear, showing a large group of tumor cells. Of special importance are the signet-ring cells.

The patient was advised to have a dilatation and curettage but since the discharge had temporarily subsided she elected not to have it done. The discharge recurred and on June 1 she went to the Cancer Prevention Society where a Papanicolaou smear was taken. Cells, suspicious of adenocarcinoma, were observed and she was referred back to her

private physician. Another Papanicolaou smear was done and again cells resembling adenocarcinoma were found. A curettage was done on July 6. Only small fragments of endometrium were obtained which microscopically did not reveal any malignancy.

Because of the postmenopausal bleeding and two suspicious Papanicolaou smears, which could not be explained, a laparotomy was performed on July 8. The uterus was of normal size but retroverted. The tubes were slightly enlarged with closed fimbriated ends. They were adherent to the posterior aspects of the broad ligaments as were the ovaries which were of normal size. A total hysterectomy and bilateral salpingo-oophorectomy were done with removal of the tubes intact.

On gross examination, the uterus was essentially normal except for two small intramural fibromyomas. The endometrial cavity showed effects of recent curettage but no evidence of malignancy. The right Fallopian tube measured 12 cm. in length and 2½ cm. in diameter. The serosal surface was smooth and glistening. It showed no evidence of any papillary processes or roughening and the wall was not remarkably thickened. The fimbriated end was not patent. When opened, the dilated tube revealed papillary gray friable tumor tissue filling the entire cavity. The left Fallopian tube measured 10 cm. in length and 1½ cm. in diameter. This also showed a smooth glistening serosal surface. The fimbriated end was closed. When opened, several small areas of papillary light gray tumor tissue were seen arising from the mucosal surface. The tube was filled with thin brownish fluid. The ovaries were not remarkable.

The microscopic findings are demonstrated in Figs. 1-3, which include photomicrographs both of paraffin sections of the tumor and of Papanicolaou smears taken before operation. Fig. 1 shows the papillary tumor mass arising from the wall of the Fallopian tube. The relatively uniform pattern with few mitotic figures is clearly demonstrated in this section. Fig. 2 is a photomicrograph of one of the Papanicolaou smears, showing a number of obviously benign epithelial cells as well as a group of hyperchromatic cells which are pleomorphic and have an altered nuclear-cytoplasmic ratio. These represent malignant tumor cells which, on careful examination, show definite similarity to those seen in Fig. 1. The type of malignancy cannot be determined from this group of cells; Fig. 3, however, also from a Papanicolaou smear, offers basis for the diagnosis of adenocarcinoma in that it shows several signet-ring cells with the nuclei pushed to one edge, leaving the remainder of the cell clear.

Comment

In the case reported, Papanicolaou smears were a significant diagnostic aid in the detection of carcinoma of the Fallopian tubes. The condition would apparently have been overlooked if the examination had been limited to curettage.

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A NEW AMNIOTOME*

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IN RECENT years the incidence of elective amniotomy has increased sharply. Although the merit of this procedure, done wisely, has been established, the technique has often included improvised use of instruments not inherently safe when used for such purpose.

Fig. 1.

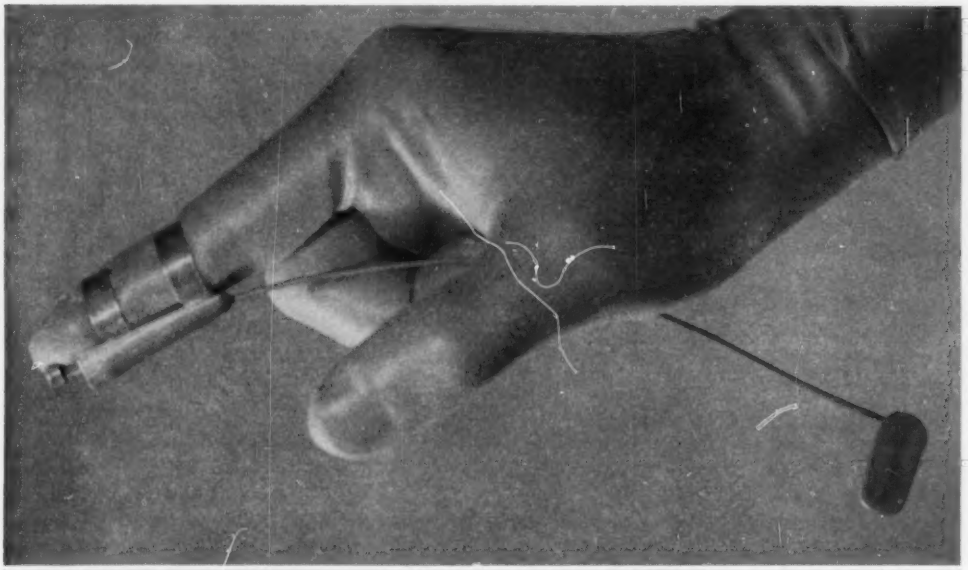

Fig. 2.

With safety and convenience in mind, a new instrument has been designed specifically for amniotomy and is herewith presented (Fig. 1). This instrument is composed of a cutting head mounted on a flexible shaft with a direc-

*Patent pending.

tional handle. The shaft passes through a sheath which is recessed to accommodate the cutting head, and the sheath is held securely to the operating finger by clips.

The advantages of this instrument can be enumerated as follows:

1. Only slight lateral motion of the finger tip is required, rather than thrust and/or gripping with an instrument tip remotely located from the hand.
2. There is no discomfort or awkwardness during examination with the instrument clipped to the examining finger.
3. Intravaginal positioning and manipulation are facilitated by the flexible shaft and are atraumatic, due to the protecting sheath.
4. Amniotomy can be done immediately upon completion of examination (Fig. 2).
5. The cutting head is always in firm contact with the impelling finger tip, giving a good "proprioceptive" sense.
6. With directional handle, the cutting head can be rotated 180 degrees in the protecting sheath before it is advanced to the finger tip for lateral motion in a chosen direction.
7. Even with the cutting head advanced to operating position adjacent to the finger tip, the sheath still offers protection to tissue by its relationship to the cutting head.

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Department of Reviews and Abstracts

EDITED BY LOUIS M. HELLMAN, M.D., BROOKLYN, N. Y.

Selected Abstracts*

American Journal of Medical Sciences

Vol. 230, February, 1956.

*Moyer, J. H., and Handley, C. A.: Renal Response to Pentolinium: Laboratory Observations, p. 134.

*Oliver, B. B., and Friedman, B.: The Effect of Estrogen Therapy on Patients With Angina Pectoris, p. 205.

Moyer and Handley: Renal Response to Pentolinium: Laboratory Observations, p. 134.

The effect of the ganglionic blocking agent, pentolinium (Ansolysin), was studied in 18 dogs by measurements of renal blood flow, glomerular filtration, and electrolyte excretion. The rate of glomerular filtration was found to decrease when the blood pressure fell. While the intrarenal resistance diminished, the decrease was not so great as elsewhere, with the result that the renal blood flow fell somewhat. Despite the decrease in glomerular filtration, there was no consistent effect upon the water, sodium, and potassium excretion.

LEON C. CHESLEY

Oliver and Friedman: Effect of Estrogen Therapy on Patients With Angina Pectoris, p. 205.

Seventeen patients with angina pectoris were treated for periods of twelve and eighteen months, during which ethinyl estradiol and placebos were alternated. No definite effects upon the angina were found. Side effects of estrogen therapy included loss of libido, breast enlargement, marked fatigue, and almost incapacitating weakness and lassitude.

LEON C. CHESLEY

American Journal of Surgery

Vol. 91, March, 1956.

*Hoerner, M. T.: Bilateral Simultaneous Tubal Pregnancy, p. 385.

Hoerner: Bilateral Simultaneous Tubal Pregnancy, p. 385.

After a short discussion of the literature, the author presents a case of bilateral simultaneous tubal pregnancy and includes operative and pathologic findings. With the inclusion of the present case, there have been 110 cases reported (as of 1954). The importance of always investigating the condition of the tube which has not been involved in the ectopic pregnancy is emphasized.

ROBERT C. KNAPP

Deutsche Medizinische Wochenschrift

Vol. 81, No. 7, February 17, 1956.

*Martius, H.: The Existence, Definition, and Treatment of So-called "Carcinoma in Situ," p. 226.

Kreuser, F.: Changes in Cancer Mortality, p. 247.

Martius: Existence, Definition, and Treatment of So-called "Carcinoma in Situ," p. 226.

Since only 20 per cent of carcinomas in situ become invasive, the author feels that the nomenclature is unfortunate. Extensive surgery is not indicated in all cases. Amputation of the cervix is thought to be more than enough in most cases.

WALTER F. TAUBER

Vol. 81, No. 9, March 2, 1956.

*Druckrey, H., Schmaehl, D., and Einem, J.: Experimental Investigation of So-called "Cancer Drugs," p. 293.

Druckrey, Schmaehl, and Einem: Experimental Investigation of So-called "Cancer Drugs," p. 293.

This is the first of a series of articles evaluating "cancer drugs" which have been sensationally reported in the general press. Such investigation is essential because of the possibility of serious mishaps and financial exploitation. Although laboratory animal reactions are not completely parallel to human reactions, such evaluation is necessary to avoid unconscionable trial and error on patients.

Under investigation here is "W G H—Solco" (Wound Granulation Hormone). Experiments on rat sarcoma in vivo and in vitro show it to be completely valueless.

WALTER F. TAUBER

Vol. 81, No. 10, March 9, 1956.

*Huhn, Fr. O., Schneppenheim, P., and Strake, H.: Tumor Growth and the Adrenals, p. 336.

Huhn, Schneppenheim, and Strake: Tumor Growth and the Adrenals, p. 336.

Clinically and histologically, it can be shown that malignant tumors put great strain on the adrenal cortex and lead to adrenal insufficiency. It is, therefore, suggested that in all treatment of malignant tumors (be it surgical, radiological, or chemotherapeutic) protection of the adrenals be considered. These patients should be treated as potentially having Addison's disease.

WALTER F. TAUBER

Vol. 81, No. 12, March 23, 1956.

*Herold, L.: Polyvinylpyrrolidone Excretion in Nephritis and Toxemia of Pregnancy, p. 402.

Herold: Polyvinylpyrrolidone Excretion in Nephritis and Toxemia of Pregnancy, p. 402.

It is shown that PVP excretion in the urine in normal pregnancy exceeds that in the normal nonpregnant state. In toxemia, excretion of PVP is depressed, though the substance is not retained in the blood. It appears that it is distributed in the edema fluid. With the improvement of the pre-eclampsia, the excretion goes up. In chronic kidney disease, PVP retention is greater than in toxemia. This difference can be utilized in the differential diagnosis between simple toxemia and pre-eclampsia superimposed on chronic renal disease. It can also be used for prognostic evaluation of the patient's condition.

WALTER F. TAUBER

Irish Journal of Medical Science

No. 361, January, 1956.

*Lavelle, S.: Coagulation Defect in Obstetrical and Surgical Bleeding, p. 23.

Lavelle: Coagulation Defect in Obstetrical and Surgical Bleeding, p. 23.

"Blood lying in contact with raw tissue surfaces appears to be a common factor," when it is recalled that "an acutely acquired haemorrhagic diathesis" may accompany premature separation of the placenta, continued intrauterine retention of a dead fetus, amniotic fluid embolism, pulmonary and prostatic resection, and multiple wounds. "Depletion of plasma fibrinogen has been observed in these cases. . . ."

The author presents a detailed laboratory study of 5 patients beneficially treated with triple concentrated plasma. The patients exhibited coagulation defects following: (1) premature separation of the placenta, (2) placenta previa and rupture of the uterus, (3) placenta previa and postpartum hemorrhage, (4) the Manchester operation, and (5) vaginal hysterectomy.

SCHUYLER G. KOHL

No. 362, February, 1956.

Feeney, J. K., and Boland, S. J.: Broad Ligament Pregnancy: Case Notes, p. 92.

Journal of the American Geriatrics Society

Vol. 4, January, 1956.

*Farley, D. M., and Wolff, J. R.: Pelvic Findings in Women Past the Age of 65, p. 1.
*Simeons, A. T. W.: Chorionic Gonadotropin in Geriatrics, p. 36.

Farley and Wolff: Pelvic Findings in Women Past the Age of 65, p. 1.

This is a review of the findings in 209 apparently well women, 65 years of age or more, who had been examined at the Cancer Prevention Center of Chicago. Most of these patients had been examined by their own physicians during the preceding five years but 25 per cent of them had never had what the patient considered to be a complete physical examination. Thirty-five per cent spontaneously mentioned distress of one sort or another related to the pelvis and when specifically questioned the number rose to 76. More than half of the spontaneous complaints dealt with the region of the rectum (hemorrhoids, pruritus, constipation, diarrhea, bleeding, etc.) but when specifically questioned complaints dealing with the bladder increased from a negligible number to 248 specific complaints including nocturia, urinary frequency, stress incontinence, and dysuria. Of the 56 women who had complaints relating to the genitals, 18 had leukorrhea, 13 had lower abdominal pain, 8 had vaginal bleeding, 6 had pruritus, 5 an abnormal mass, and 2 had uterine prolapse. Physical examination showed that only 6.7 per cent of the entire group of women had normal pelves. Sixty-seven per cent (140 patients) had what was described as senile atrophy and this had progressed to the point of adhesive vaginitis in 8 instances. Pelvic relaxation was noted in 48 per cent of the women, of whom more than a third had a cystocele. A urethral caruncle was found in 29 women and cervical polyps in 12. Nine instances of purulent to bloody discharge were found and 9 cervical erosions were also found. A fixed mass adherent to the uterus was noted in 6 instances and there were 5 fibroids as well as other miscellaneous abnormalities, including a forgotten pessary and a fixed mass in the bladder.

A cervical smear stained by the Papanicolaou method was reported as Class I in 195 of these women, Class II in 11, Class III in 1, and Class IV in 1 woman. No instances of Class V were found. The Class IV smear was associated with a carcinoma of the cervix. The Class III smear was found in a woman with severe adhesive vaginitis who did not return to the clinic. Of the Class II smears, most were found in women with senile atrophy but 2 of these smears when repeated were reported as Class III, and of these 1

was associated with a large endometrial polyp and 1 with a carcinoma of the endometrium. In addition to these 2 cancers of the genital tract, 7 other instances were found (4 in the rectum, 1 in the breast, 1 in the skin of the nose, and 1 in the bladder). The conclusion is reached that of the presumably well women 65 or more years of age, 1 in 23 had cancer.

DAVID M. KYDD

Simeons: Chorionic Gonadotropin in Geriatrics, p. 36.

Based on work previously reported (Simeons: The Action of Chorionic Gonadotropin in the Obese, Lancet 2: 946, 1954), the author presents his scheme of rapid weight reduction. This includes use of 125 international units of chorionic gonadotropin together with a diet containing 500 calories contained in 2 meals a day. This regimen, promoting the loss of between 1 and 2 pounds a day, is continued for a period of 20 to 40 days and, if necessary, repeated after an interval of normal diet for 6 weeks. The beneficial effects of such a regimen in the treatment of circulatory disorders, gout, diabetes mellitus, and rheumatoid arthritis are discussed but no data are included.

DAVID M. KYDD

Vol. 4, April, 1956.

*Shelton, E. K.: The Pros and Cons of Estrogen Administration After the Menopause, p. 348.

*Anglem, T. J., and Bradford, M. L.: The Evaluation of Major Surgery for Cancer in the Aged, p. 336.

Shelton: The Pros and Cons of Estrogen Administration After the Menopause, p. 348.

This somewhat philosophic report, presented before the Graduate Symposium on Geriatric Medicine given by the American Geriatrics Society at New York on Nov. 12-13, 1954, expresses the thesis that the use of estrone sulfate (or its equivalent), in doses of from 0.625 to 1.25 mg. daily, is of benefit in helping our aging female population retain the vim and zest that modern life demands through the difficult menopausal and postmenopausal periods. Considering the fact that the death rate from cancer of the uterus was not notably different in 1950 from that in 1930 when the estrogens began to be administered, the author does not believe there is a relationship between the giving of estrogens and uterine cancer. The author is less certain in regard to the relationship of estrogen administration to breast cancer. Although no figures are given, the author believes that the incidence is the same in those who have received estrogen therapy and those who have not.

Three interesting case reports are given illustrating the possible role of estrogens in delaying aging, preventing osteoporosis, and ameliorating hypertension.

This paper is timely because sufficient estrogenic material is now available to treat 7 million of the 15 million women between the ages of 45 and 65 years.

DAVID M. KYDD

Anglem and Bradford: Evaluation of Major Surgery for Cancer in the Aged, p. 336.

In 1900 there were 1,782,000 persons in the United States 70 or more years of age. In 1950 there were 7,266,000 and this figure will become 9,837,000 in 1960. Thus the population is not only expanding but aging. Today a man of 70 has a life expectancy of 9.6 years and a woman, 10.8 years. At the age of 75 these expectancies become 7.3 and 8.1 years, respectively, and at 80, 5.4 and 5.8 years. At 85 the life expectancy is still 4.1 years.

In this report, 258 patients over the age of 70 who underwent 318 major operations for carcinoma were studied. The over-all operative mortality was 15.1 per cent (curative operations 11.3 per cent, palliative operations 21.4 per cent, exploratory operations 15.8 per cent). The operative mortality in curative operations has decreased from 21.4 per cent in the period 1936-1941, to 6.7 per cent in the years 1951-1952. The decrease in mortality resulting from palliative and exploratory operations has been less striking. Fol-

lowing the 174 curative operations that were performed, 39 patients were living 5 or more years without recurrence, 28 additional patients were well but had their operations less than 5 years before, 16 patients had died of other causes without evidence of recurrence.

One patient still alive has developed a recurrence and 70 have died because of a recurrence of the tumor. Of these 70, 59 survived more than 6 months, 41 more than 1 year, 27 more than 2 years, and 13 more than 3 years. Eight died during the fourth year, 4 during the fifth, and 1 during the sixth year after the operation.

Eighteen patients had 20 operations performed for tumors of the head and neck, 50 per cent of whom had 5 year cures. Nineteen patients had 20 operations on the breast and 36.8 per cent were cured for 5 years or more. Sixty per cent of the 10 operations performed because of cancer of the cecum or ascending colon were successful, as were 30.8 per cent of 13 operations on the stomach, 30.8 per cent of 13 operations on the colon, and 33.3 per cent of 12 excisions in the rectum. Of 9 operations done in the pelvis, 2 resulted in 5 year cures. These figures obtained in patients over 70 years, although small in numbers, are said to compare favorably with the end results for similar operations at all ages and the plea is made that the benefits of surgery should not be withheld on the basis of age alone.

DAVID M. KYDD

Journal of Clinical Endocrinology and Metabolism

Vol. 16, February, 1956.

*Greenblatt, R. B., Carmona, N., and Higdon, L.: Gonadal Dysgenesis With Androgenic Manifestations in the Tall Eunuchoid Female, p. 235.

Greenblatt, Carmona, and Higdon: Gonadal Dysgenesis With Androgenic Manifestations in the Tall Eunuchoid Female, p. 235.

A 25-year-old white woman, referred because of amenorrhea, lack of breast development, enlarged clitoris, and extreme bodily thinness, was 70 inches tall, had sparse pubic and axillary hair, no hirsutism or acne, a well-formed vaginal canal, and an infantile uterus. Urinary 17-ketosteroids were low and urinary FSH was normal. There was a female sex chromatin pattern in the skin. The sella turcica was normal. An exploratory laparotomy was performed and rudimentary gonadal structures, an infantile uterus and Fallopian tubes were found.

Histopathologic study of the ovary showed typical ovarian stroma without ova or follicles. There were scattered groups of cells resembling Leydig cells and some groups of mesonephric cells. This case is another of the unusual cases of intersexuality, but the virilization was not thought to stem from the Leydig-like cells.

J. EDWARD HALL

Vol. 16, March, 1956.

*Bentinck, R. C., Lisser, H., and Reilly, W. A.: Female Pseudohermaphrodism With Penile Urethra, Masquerading as Precocious Puberty and Cryptorchidism, p. 412.

Bentinck, Lisser, and Reilly: Female Pseudohermaphrodism With Penile Urethra, Masquerading as Precocious Puberty and Cryptorchidism, p. 412.

This is an unusual case of intersexuality with normal female internal genitals and a penis with functioning urethra. The vagina opened into the urethra in the region of the prostatic portion, but no prostatic tissue was present. There was marked adrenal cortical hyperplasia. Chromosomal sex pattern was not known since the patient was studied many years ago.

The authors emphasize that every effort should be made to determine the real sex of these patients early in life so that they may be treated properly. The chromosomal sex pattern is a great aid.

J. EDWARD HALL

Wiener Medizinische Wochenschrift

Vol. 106, No. 2, Jan. 13, 1956.

*Fischer, F.: Diabetic Retinopathy and Pregnancy, p. 45.

*Gigl, J.: Agenesis of the Müllerian Ducts in an Adult, p. 46.

Fischer: Diabetic Retinopathy and Pregnancy, p. 45.

With the advent of modern treatment of diabetes, the relationship of diabetes to pregnancy becomes increasingly important. It is suggested here that diabetic women with retinopathy be advised against becoming pregnant, particularly if they have retinitis proliferans. With this latter condition, even interruption of pregnancy, if already present, must be considered seriously. The appearance of retinopathy or diabetes in pre-existing pregnancy has a much better prognosis, and usually does not require such radical interference.

WALTER F. TAUBER

Gigl: Agenesis of the Müllerian Ducts in an Adult, p. 46.

This article reports a case of complete agenesis of the Müllerian ducts. Contrary to previous belief, this anomaly is not incompatible with life. The patient was 18 years old when first seen, and except for a total lack of pubic and axillary hair, had the external appearance of a fully developed woman. Of course, she had never menstruated.

On examination, a 4 cm. vagina and pelvic masses interpreted as ovaries were found. At laparotomy, no evidence of any Müllerian derivative was found. Gonads were present. These were biopsied and corresponded histologically to undifferentiated sex glands of a 4- to 5-week-old fetus. No urinary anomaly was found. There is no clue to the etiology in this case.

WALTER F. TAUBER

Vol. 106, No. 10, March 10, 1956.

*Tapfer, S.: Radical Hysterectomy (Wertheim), p. 237.

Tapfer: Radical Hysterectomy (Wertheim), p. 237.

This is a discussion of results of 151 radical hysterectomies (not including lymph node resection) for carcinoma of the cervix performed in Innsbruck since 1940. Fifty-one of these are too recent for 5 year evaluation. Cases operated upon were in Stages 1 and 2 except for an occasional case in Stage 3 or 4 with an inaccurate preoperative diagnosis.

In the over-all series, results included one death and 14 complications of various sorts, such as transitory vesicovaginal fistulas. Among the patients operated upon more than 5 years previously, 70 have had 5 year cures and 22, earlier recurrences.

The following conclusions are drawn: (1) Proper selection of cases should give a fairly constant percentage of patients with carcinoma of the cervix who are operated upon at any given center (Innsbruck—20 per cent). (2) Early diagnosis is of the greatest importance. (3) Radical surgery should be done only in hospitals that have expert personnel and adequate equipment.

WALTER F. TAUBER

Vol. 106, No. 11, March 17, 1956.

*Rigo, J., and Erneszt, J.: Preparation of the Cardiac Patient for Delivery, p. 261.

Rigo and Erneszt: Preparation of the Cardiac Patient for Delivery, p. 261.

The relationship between heart disease and pregnancy is discussed. It is shown that adequate prenatal care, usually including hospitalization, improves the prognosis for these patients. However, in contrast to some other investigators, these authors state that pregnancy decreases the life expectancy of cardiac patients. All those with severe heart disease in this series were subjected to cesarean section. No maternal deaths are recorded.

WALTER F. TAUBER

Vol. 106, No. 13, March 31, 1956.

Klaften, E.: Peritoneoscopy Through the Anterior Fornix, p. 295.

Correspondence

Comments on Relaxin

To the Editors:

May I offer two comments on the paper by E. Eichner and colleagues on "Relaxin, the Third Ovarian Hormone," which appeared in your May issue?

If this substance relaxes the matrix of collagen, in which all the uterine muscle cells are interwoven, then it may prevent the individual muscle cells from acting in concert to raise the gross uterine tone without in any way reducing the contractility of muscle cells in the way that progesterone or levo-adrenaline would do. The readings with the Reynolds' tokodynamometer would be unable to differentiate these effects but the electrohysterograph might reveal any change in muscle cell activity associated with relaxin.

If, as seems possible, relaxin has a generalised effect on the uterus, then its value in softening the cervix is nullified by the associated "softening" of the fundal connective tissue. A drug with a specific effect on the cervical collagen seems to be desirable, or perhaps relaxing substances can be introduced locally into the cervix, e.g., hyalase, dihydrocortisone, or relaxin. Gross clinical observations of the type described are valuable in establishing the absence of side effects and sometimes may provide a crucial test of effectiveness. In the case of relaxin it appears that tests of its efficacy in labour must be made with due regard to the complexity of uterine mechanics, and it is on these lines that we are working.

A final point: Has relaxin any claim over androgens to be regarded as the third ovarian hormone?

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B.M., B.Sc.(Eng.), M.I.E.E.

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London, W. C.1
June 25, 1956

Reply by Dr. Eichner

To the Editors:

Dr. Smyth's comments contained certain physiologic explanations which I could not answer. We realized the inadequacies of the tokodynamometer but that was the best equipment we had. Clinically, softening of the cervix is marked, but "softening" of the uterus does not occur except as indicated by the failure of progressive labor. This seems to be the result of disorganized uterine contractions. This uterus, however, is quite capable of responding to Pitocin; in fact, in many cases if treatment with relaxin was inadequate and failed to stop labor completely, precipitous delivery often occurred within a short period after the cessation of relaxin treatment.

R. L. Kroc, Ph.D., Director of Physiological Research at Warner-Chilcott Laboratories, comments as follows:

"The comments of C. N. Smyth are interesting and provocative. Unfortunately, little is known regarding the mode of action of relaxin on the uterus of the human or experi-

mental animal. Zarrow et al., AM. J. OBST. & GYNEC., August, 1956, reported changes in the cervix of the sow indicative of depolymerization and increased water content.

"Relaxin may be considered to have priority over androgen as the third ovarian hormone because: (1) it was discovered earlier—Hisaw's papers 1926-1930; (2) it appears to be present in larger quantity—at least in the ovaries of pregnant sows; and (3) it is more obviously a female hormone."

EDUARD EICHNER, M.D.

10605 CHESTER AVENUE
CLEVELAND 6, OHIO
SEPTEMBER 17, 1956

Correction and Reiteration

To the Editors:

In our recent article in the GRAY JOURNAL entitled "The PSP (Phenolsulfonphthalein) Test for Tubal Patency" (vol. 72, p. 170, July, 1956) we wrote that Dr. T. Richard Hofmann was of the opinion that absorption of the phenolsulfonphthalein took place in the Fallopian tubes. Dr. Hofmann has recently communicated with me, pointing out that our interpretation of his remarks was in error. I should like to take this opportunity to correct our error and to put his recent words in print. They are: "As I stated in my article, I believe that endometrial rather than tubal absorption probably accounts for the so-called 'false' positive tests. Two patients in my series of cases had bilateral salpingectomy performed and in each patient a positive test was observed."

I should like to add at this time that a study was started at Bellevue Hospital in New York City in which PSP tests were done at various intervals during the menstrual cycle to determine the possibility of absorption of the dye during particular phases of the cycle. Although the study was not completed, we obtained no striking results and no false positive results except in some cases of tubal ligation. Again we wish to reiterate that if correctly done there is not enough absorption, if any, from the endometrium to interfere with the accuracy of the test.

GEORGE SPECK, M.D.

2808 SOUTH RANDOLPH ST.
ARLINGTON, VIRGINIA
SEPTEMBER 10, 1956

Items

American Board of Obstetrics and Gynecology, Inc.

The next scheduled examination (Part I), written examination for all candidates, will be held in various cities of the United States, Canada, and military centers outside the continental United States, on Friday, Feb. 1, 1957.

Case Reports are due in the office of the Secretary within 30 days after notification of eligibility to the examinations and must be compiled in the manner described in the current Bulletin.

ROBERT L. FAULKNER, M.D., Secretary
2105 Adelbert Road
Cleveland 6, Ohio.

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EDITORS
HOWARD C. TAYLOR, JR., and WILLIAM J. DIECKMANN

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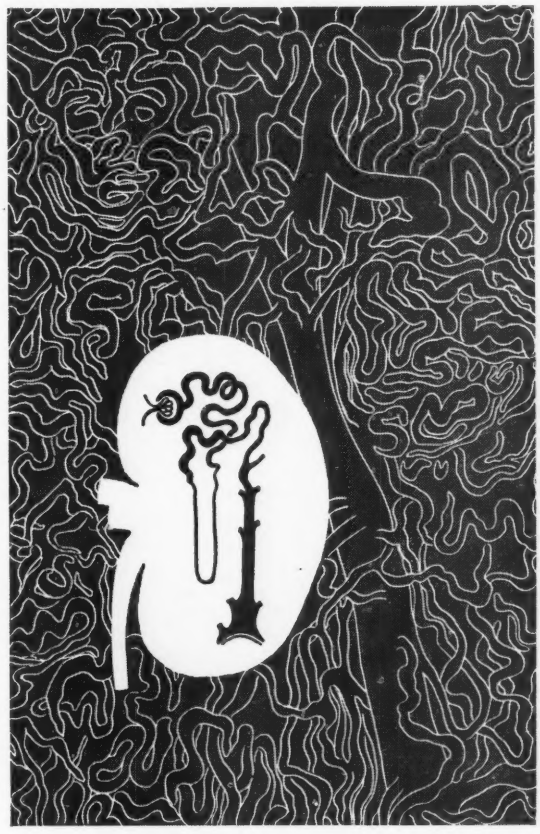

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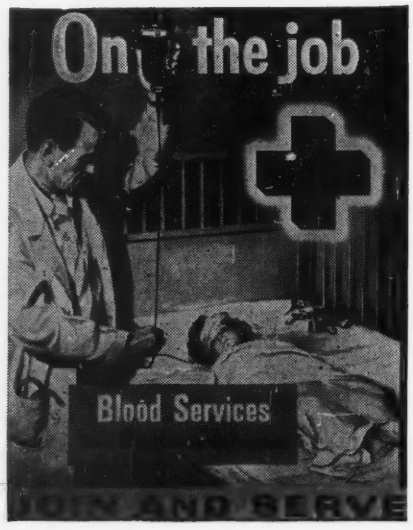

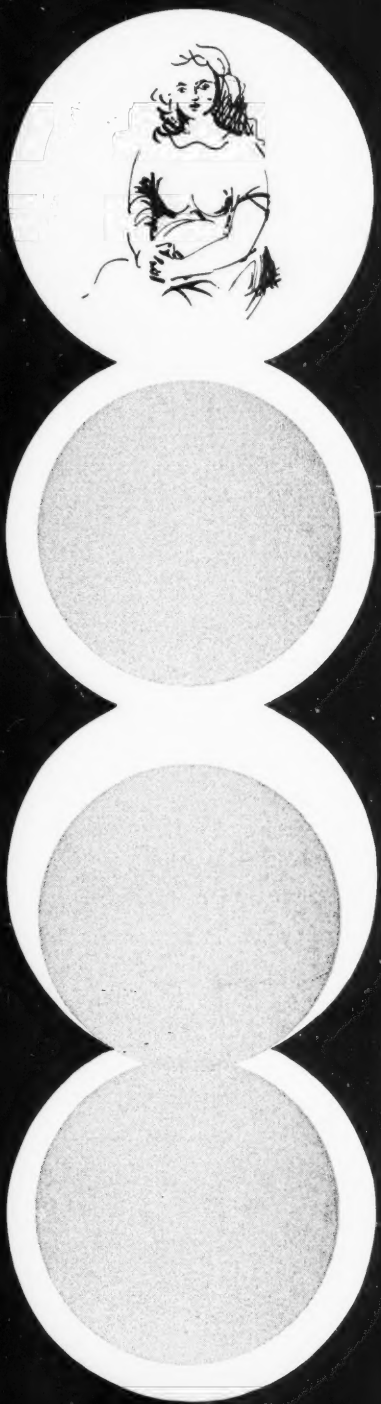

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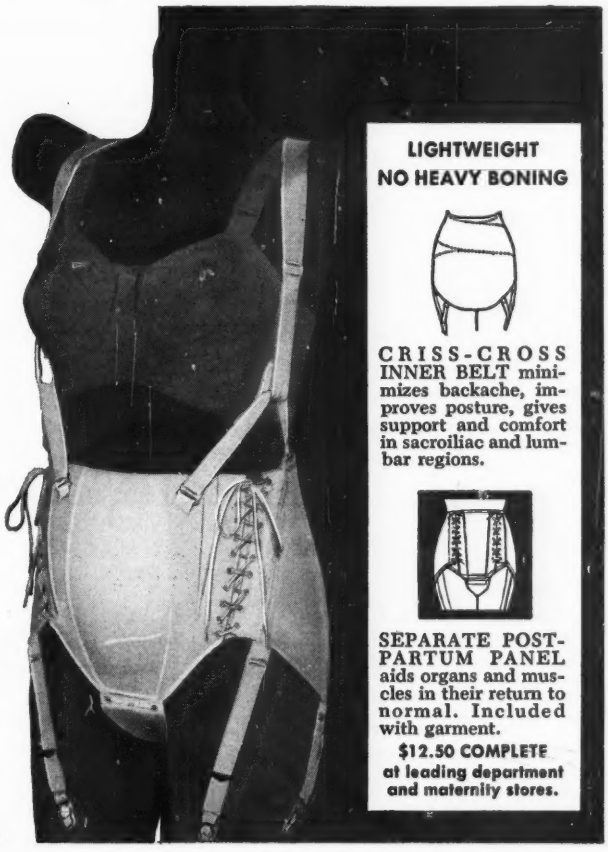
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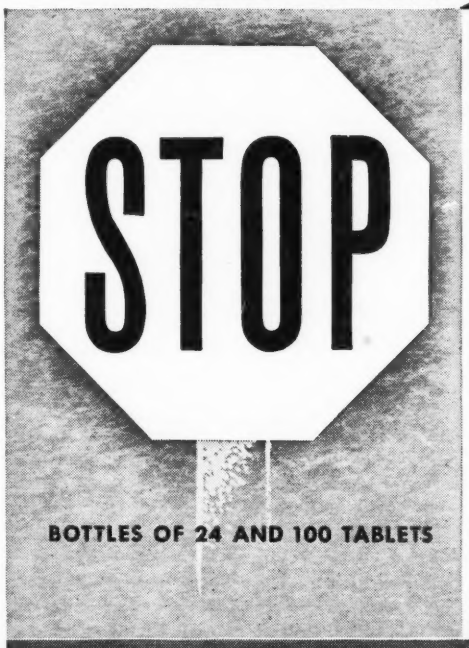

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